Installation and manual for Calciumreaktor JETSTREAM 1

Calciumreactors with different efficiency are present on market since several years. Besides the supply of invertebrates a constant level of calciumhydrogencarbonate plays an important role in the buffer capacity of seawater. If this capacity is kept high the tendency of declining pH value (by acidic influences are caused by metabolism of diverse microorganisms) is reduced considerably. **SCHURAN** seawater equipment has constructed the calciumreactor totally new: Carbondioxide is taken up by an injector system. In parallel carbondioxide bubbles which were unused and did not dissolve and react to carbonic acid in the reaction chamber are also recatched by a gas/water separator and are transported through the suction of the injector again into the reaction chamber. Besides carbondioxide so called restgases (from gas bottles, mainly nitrogen at 0,25% level) are used for improoving convection inside the reactor until they become dissolved. This does not influence the dissolving process of carbondioxide! Nitrogen an other gases forced manufacturers to degasing mechanisms, all of which were unreliable and sensitive. The water loaded with carbonhydrogencarbonate leaves the reactor free of any bubbles. JETSTREAM can be attached to the wall or can be positioned under the aquarium.

Working principle:
Seawater being saturated with carbondioxide flows through JETSTREAM´s reaction chamber (1). Its propulsion is managed by an unmodified Eheim 1250 pump. Carbondioxide and water react to carbonic acid, which causes a pH decline in which coralsand consisting mostly of calciumcarbonate dissolves as calciumhydrogencarbonate. Besides the solvation of this substances trace elements are set free which were once accumulated by the living coral an integrated into the living coral skeleton. The produced solution leaves the reactor via an upper outlet (3) integrated in the top of the reactor (4). The amount of water running through the reactor is managed by a tap valve (5) integrated in the inlet pipe which makes adjustment easy. Carbondioxide and restgases which did not dissolve in the reaction chamber is recatched by the gas/water-separator (6) and injected into the reaction chamber. The suction necessary for this is created by the injector (7). In this way JETSTREAM can be driven with an overdose of carbondioxide which cannot escape out of the reactor. This advantage is of high importance when high grades of kH values are needed, i.e. when a large aquarium (1500-3000l) should be supplied with calciumhydrogencarbonate.

Installation:

JETSTREAM has to be connected with a pipe through which water is pumped with pressure. A suitable pipe therefore is the one which is transporting the water from the filter sump back into the aquarium. A hole must be drilled into such a pipe and a small pipe then has to be glued into this hole. On this piece of pipe the tube which leads the water to the Jetstream is mounted. This and the inlet tube of the JETSTREAM have to be connected by the orange tapvalve. ***Only with this tapvalve the amount of water passing through the* JETSTREAM *is regulated. Never attach a tapvalve on the outlet of the* JETSTREAM. *This must always be kept open. The outlet hose must not be led up otherwise a high water column on the system results. Therefore the outlet pipe should be placed downwards in a filtersump.The water and gas hoses must be air/water tight, because the injector causes these hoses to be under low pressure. If air is sucked through any untight***

connection, nitrogen is sucked inside and builds up amounts of gas which cannot be dissolved within short time and therby hinders the reactor in working correctly.

Filling JETSTREAM with coralsand:
We recommend coralsand with a grain size of approx. 10-15mm. If the grainsize is smaller, the filling might clump and the passage of the water and thus the capacity of the injector is highly reduced. The bottom (8) of the reaction-cartridge could also be closed.
Before filling is possible remove the cartridge off its holding flanges by removing the 4 screws of the upper and the lower flange (10). Then the cartridge can be taken out. Now cleaned coralsand can be filled into the cartridge up to approx. 2cm below a upper edge of it. Do not fasten the screws too tighten. Be aware that no grain of coralsand is entering the pipes. If this happens single grains are passing the pump and enter the injector system which then ceases working. In such a case the injector has to be cleaned. The screw (positioned on the backside) holding the injector and the attached pipes must be removed and then the injector can be taken off.

Filling the reactor with water/water removal:
To fill the JETSTREAM with water the tapvalve of the pressure pipe should be totally open. However the waterlevel cannot go higher than the pipe through which the water leaves the reactor. To remove the rest of air inside the gas/water separator loosen the screw which holds the hose to the injector to let the air out until water comes out. Then place the hose again on the holding screw. The large tap valve on the right side of the Jetstream can also be used for filling the reactor with water. This valve enables the customer to check wheter there is still gas in the system. If there is no gas in the system the pump can be switched on.
To remove water in case of a new filling open the tap valve and the outlet valve on the bottom of the reactor to let air inside.

Carbondioxide supply and pH control:
JETSTREAM can be used without pH-control unit. The control of the water quality must be checked by titration of the KH. The number of bubbles used can be easily determined via the Bubble Count and should be around 80-100 bubbles/min. The amount of water passing the reactor should be in between 30-50ml/min. If more carbondioxide is used the outlet can be opened much more (120ml/min.) To reach a high KH value it is necessary to reduce the pH to 6,2 or even lower. The pH value has to be determined by the aid of titration of the outlet water.
Carbondioxide is let into the JETSTREAM via an armature into the BubbleCount. The bubble counter should be regularly filled with sweet water (by syringe with injection needle), because of evaporation of the water.
We recommend to interrupt the gas flow in the night by a magnetic valve which action is triggered by a timer. Only in case of a very large aquarium the gas can be supplied the whole day and night. However the pump of the Jetstream should not be switched off during the night. The amount of calciumhydrogencarbonate which is used in the aquarium is dependent on the amount of consuming animal. Therefore we cannot give concrete hints as to the dosage.

Degasing the outlet water:
Free carbondioxide or more correct rests of free carbonic acid should not be let into the aquarium because these can cause an intensive growth of certain algae. Water of the JETSTREAMs outlet is best let over a trickle filter or towards the water suction of a skimmer. The highly oxygene saturated water removes any rests of carbondioxide effective, however high saturated outlet water can be caused to show fall outs of calciumcarbonate in highly oxygenated water.

Adjustment:
Exact adjustment is achieved by titrationtests of the outlet water. Usually the suitable KH-value inside the tank should be in between 10 and 15. Hydrogencarbonate and calcium is set free in natural proportions and therefore is mostly no need to control the level of calcium in the water.

Important notes on titration tests:
Titrationtests are suitable to determine concentration of hydrogencarbonate *only up to 20 degrees*, values over 20 cannot determined exactly. If you expect higher values dilute the water in a 1:1 or other suitable relation with destilled or osmosis water which contains no hydrogencarbonate or calcium. Muliply the result with the dilutionfactor chosen, i.e. factor 2 when dilution is 1:1.

Generally there are two methods of lifting up the levels of hydrogencarbonate and calcium:
- increase the number of bubbles per minute
- by closing the inlet cock water stays longer within the system and the level of acidity and hydrogencarbonate and calcium is increased thereby.

Duration of using a single cartidge-filling:
After some weeks and months of use the contents of the reaction cartridge is mostly dissolved and has to be replaced. If grains become to small there is danger of clumping which can cause disfunction of the reactor. We recommend to exchange the coral sand when it is shrunken to approx. a fifth part of the original volume.

Pump:
The pump is not modified and for cleaning follow the notes of the manufacturer. You can remove the impeller after opening the bajonett-ring. We recommend a cleaning when the filling is to be exchanged. In this moment the injector should be checked also. Therefore the JETSTREAM must be switched off an the water has to be removed. The injector can be taken off together with the pipes after having removed the holding srew on the backside.

Useful hints:
- Wasch your new coral sand before it is used in the reactor. By placing the coral sand in osmosis water most of the phosphates are dissolved in the water and thus is not brought into the tank.
- If you do not use pH controllers adjust the outflow to appr. 40ml/min and inject 100 bubbles/min or choose another couple of values out of the performance diagramm. The pH must be below 6,5. This can be determined checking the outflow.

Technical Data:

height: 60 cm
standfloor: 33 x 15 cm
volume of the cartdridge: 2,5 l for 4kg of coralsand
amount of oulet water: 3 l/h or more
KH°- capacity example: At low basic carbonhydroxide-level of 7 degrees the Jetstream manages a increase up to 28 degrees at an outlet amount of 3l/h at pH 6,2. When more carbondioxide is used the capacity can be increased significantly.

Controlunit for JETSTREAM (accessory)

The control unit consists of a pH measuring unit which is connected to a standard pH-electrode. This is to be inserted instead of the large tapvalve of the JETSTREAM. The controlunit switches the plug from which the magnetic valve box is supplied with electricity .
The pH level is set on the potentiometer of the controlunit (f.e. pH 6,2). Below the chosen value the carbondioxide supply is ceased by the magnetic valve which is closed then. An increase of the pH value effects the magnetic valve to be open again and carbondioxide is supplied again. The magnetic valve contains a ventile which hinders the seawater in penetration into the units and the armature.
The electrode has to be calibrated regularly for exact measuring. Follow the instructions of the manufacturer. When the electrode is removed from the JETSTREAM the reactor has to be switched off.

Avoiding malfunction of JETSTREAM Reactors

Jetstream reactors are superior units which have an optimal function second to none. However the totally different construction compared with usual calciumreactors often causes questions, especially in first use. In the following table the common problems are explained and the solutions are presented.

Observation/problem	Reason	Solution of the problem
There is no suction in the injector. Gas collects in the top of the gas/water separator and leaves through the outlet. No circulation of gas visible.	The coral sand/filling material is too fine. The current is to weak to cause suction in the injector.	Use a coarser coral sand/filling material.
	The injector is blocked by a grain of coral sand/filling material. Alternatively hoses or the blue connection nipples are blocked by calcareous deposits.	Dismount the injector tubing and remove the blocking grain. Clean hoses or blue connection nipples.
Gas circulates in the reactor, however the amount builds up too high and the surplus leaves the reactor via the outlet.	Water inlet throttled too much. Gas cannot be dissolved anymore. The water inside the reactor is milky.	Open the water inlet tap valve and adjust it in a more suitable position.
	The inlet tap valve is blocked by sediment particles.	Open and close tap valve to remove sediment particles. Try to prevent such sediment to be sucked in by the pump, tubing or hoses.
	Connections of hoses are not tight.. Air from outside the reactor is sucked in and cannot be dissolved due it contains 78% nitrogen and collects quickly in the reactor. Same situation when no CO2 is applied.	Check and tighten all connections from the CO2 bottle including magnetic valve
	Water outlet directed too much downwards. This causes a low pressure situation and thus gas accumulation.	Outlet hose should be positioned in a higher level or reactor should be hung lower. Alternatively shorten the hose and fasten it in a open tube.
	CO2 is overdosed and accumulates in the reactor´s gas/water separator.	Reduce CO2-amount or increase the amount of water passing the reactor.
No high carbonate hardness to be measured. Gas does not circulate or in little amounts only.	pH- value is not below pH 6,5. Only below this brink coral sand/filling material is dissolved.	Throttle water inlet valve or increase amount of CO2 bubbles to reach a suitable pH-value below 6,5.

Calciumreactor JETSTREAM