

AquaCareFlotor

- the new generation -

High Power Protein Skimmer



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Advantages of the AquaCareFlotor ACF

- **filter sump** or **external** skimmer versions
- different gassing systems possible:
 - models with wooden diffusers that can be easily exchanged from the outside
 - venturi models with effective injector
 - needle wheel for short models
- extremely high contact time between seawater and air with small size, thus:
 - high oxygen enrichment
 - strong formation of the carbon dioxide/hydrogen carbonate/ carbonate buffer
 - more uniform pH value
 - much smaller size compared to conventional skimmers
 - low operating costs
 - **Response concentration at 3 µg/l** protein (BSA, ozone mode)

AquaCareFlotor
ACF1000V-060



Foto: Othmar Pötsch

- **reduces the free bacteria number** of the aquarium water to approx. 20%
- **reduces ozone consumption** by approx. 70% compared to other systems

Why skimming?

In all aquariums waste products are produced continuously. Fish excrete a large part of the ingested food in the form of ammonium / ammonia (= NH_x), proteins, their building blocks (amino acids) and fibers (dietary fiber). In order to prevent the fish from poisoning themselves over time, these substances must be removed or converted to non-toxic products. With the help of biological filtration almost all degradation steps up to carbon

dioxide, water, nitrate, phosphate and sulfate. However, the final products accumulate. Using skimming or flotation, proteins are immediately removed from the water without being microbiologically oxidized to the end products. The result is a much lower increase in end products, especially nitrate and phosphate. The water is less polluted, the redox potential (ORP) is higher and the animals feel much better.



picture: Dirk Walber

In the presence of a sudden load, e.g. due to a dead animal or increased feeding, a biological filter can only react very slowly to the "extra work". Especially the nitrifying bacteria (*Nitrosomonas* and *Nitrobacter* group) have adaptation times of several days. Flotation, however, reacts immediately and can prevent or mitigate the accumulation of the toxic intermediates NH_x and nitrite.

Principle of flotation

Proteins have the characteristic of attaching themselves to surfaces. During flotation, an enormous surface is created with the help of very many and very small air bubbles. The proteins attach themselves to the surface (static attraction, adsorption). In addition, other substances can dock onto the attached proteins: dirt particles, dead cells (bacteria, algae, fungi) and partly metals (a sufficient supply of trace elements should be ensured!).



picture: Othmar Pötsch

A precondition for a functioning flotation is a small air bubble size (diameter below 1 mm), a salt content of at least 15‰ and a fat content that is not too high.

The effectiveness of flotation depends on several factors:

1. The higher the temperature, the faster proteins adsorb to the air bubbles.
2. The smaller the bubbles, the more surface area and thus the better the skimming performance.
3. The longer the contact time, the better the flotation.
4. The lower the turbulence (vortexing) in the reaction tube (contact tube), the less proteins and adhering contaminants will be re-detached from the air bubble.
5. The lower the protein load in the aquarium, the higher the percentage skimming yield.
6. Ozone addition to the air precipitates further waste materials and statically charges uncharged proteins so that these materials can also be skimmed off. Protein skimming is increased by 30% with ozone.

Additionally advantages of the flotation technique

During flotation, a high volume of air is brought into contact with water. Due to the pa-

tented gas bubble guidance in the liquid, the oxygen content is raised above the saturation value by 2 mg/l with the skimmer. Oxygen deficits caused by animal respiration and the biofilter are compensated.

Carbon dioxide is constantly consumed by plants (algae) and many animals (corals with zooxanthellae) in the marine aquarium, so the carbonate hardness drops and the pH of the water rises too much during the day. The AquaCareFlotor effectively enriches the water with carbon dioxide from the air and reduces this problem.

The bacteria content is reduced considerably - to approx. 20%. Finest pollutants and precipitates are quickly removed from the water and provide crystal clear water. The colors of the animals work optimally.

Some variants of skimming technique

Co-current principle:

Water and air bubbles move in the reaction tube from bottom to top - i.e. in the same direction. The contact time air / water and thus the performance of the skimmer is low.

Countercurrent principle:

The water is directed from top to bottom through the reaction tube, the air from bottom to top. The contact time is increased with this principle - the skimming works better.

Suspended current principle - AquaCareFlotor:

The aquarium water is enriched with air by an air

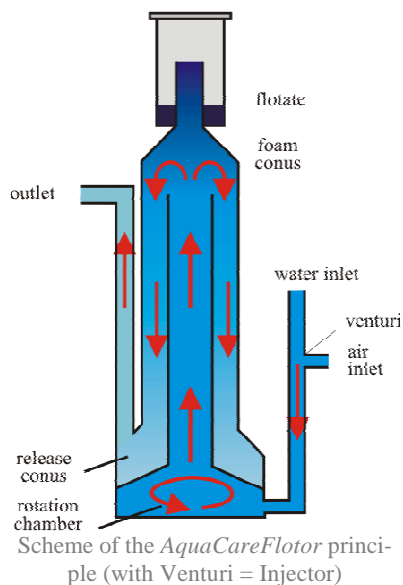
wood, injector or needle wheel and fed into the unit at the deepest point. The rotation chamber is located at the lowest point. Since the highest pressure is in this section, gas exchange is improved. The water-air mixture rises in the reaction tube. The protein-containing foam column forms there.



picture: AquaCare

Some of the air bubbles are forced downward through the outer tube by the water flow. At the expansion cone, the water flow slows down due to the larger tube cross-section. This principle allows the air bubbles to remain in the water for a particularly long time and to accumulate considerably more protein.

After a long contact time (gas bubble-water), the bubbles return to the foam section. The foam rises to the top and is slowly dehydrated. The solid foam, which is loaded with waste materials, reaches the collecting cup. In this way, waste substances are effectively and safely removed from the aquarium.



Too much skimming?

AquaCare means that too much skimming cannot take place. The larger the skimmer, the cleaner the water. But to prevent deficiency symptoms it is essential to dose trace elements in case of oversized skimmers. Also, with oversized skimmers, food for fish and lower animals (e.g. plankton) can be handled more generously. Animals that are well fed are less susceptible to diseases, live closer to nature and show a more natural behavior. A fattening of the animals - as in freshwater - is hardly possible.

What is the right skimmer for me?

First of all, the available space should be considered. Does all the technology have to go under the aquarium or is there enough space for a tall version?



High skimmers are more effective than lower models in any case because of the longer water reten-

tion time (at same water inlet flow).

However, this statement is only valid for the same process. If different processes or skimmers from different manufacturers are compared, it is possible that a low model will perform better than a high model.

The second decision to be made is the bubble injection system. When considering the performance of aquaristic skimmers, there is only one winner: the wooden skimmer. With good wooden diffusers, very fine and uniform bubbles can be generated with little pressure (little energy). This point is very important for the performance of a skimmer. The disadvantage of wooden diffusers is their relatively short service life. Every 4-12 weeks the air stones have to be replaced, because the performance is reduced by algae and bacteria deposits and by decomposition processes of the wood. The use of ozone intensifies the decomposition processes.

To minimize the maintenance AquaCare has placed the wood injectors in an extramodule outside the actual skimmer.


The injector, also called venturi, is in principle maintenance free. In smaller aquaristic systems the gas bubble size is a little bigger; the efficiency a little lower. However, if a venturi is compared to a wooden skimmer that is too old, the injector wins the comparison. - For large skimmers with corre-

spondingly strong pumps the bubble size is comparable to that of wooden diffusers due to the higher working pressure.


The AquaCare injector types need only one pump for the water inlet and for the bubble generation. The wood injector types need additionally an air pump.

The AquaCare injectors are optimized so that calcification (KH up to 10°dH) is nearly impossible.

The needle wheel pump is an alternative when it comes to energy saving and effectiveness. With good processing, the needle wheels last a sufficiently long time.

 **For small skimmers, wooden diffusers are more effective than venturi nozzles - as long as they are replaced regularly.**

Finally, the question remains, what water flow rate should the skimmer have.

 **Basically, the higher the water flow rate, the more contaminants the skimmer**

can remove from the aquarium water, the better the water quality.







This is because the skimmer competes with biological degradation processes in the aquarium and filter system. The lower the exchange rate between skimmer and aquarium, the more biodegradation will occur in the aquarium instead of being physically removed by the skimmer.

The maximum aquarium sizes given by AquaCare for the respective skimmer models are related to an turn-over of 1.5 hours, i.e. the aquarium volume is theoretically passed through the skimmer in 1.5 hours. If the aquarium is fed a lot and the stocking density is high, the turn-over should be increased. Rates below 0.2 hours in small aquariums should not be attempted for cost reasons. In systems with low organic load (little food, few animals) the turn-over can be increased. But it should be noted that the risk of oxygen deficiency, bacterial bloom, and low ORP increases with undersizing.




picture: Othmar Pötsch

Short Comparison between type "A" and "V"

Type	Type "A"	Type "V"	Type "N"
System	wooden air stone	venturi = injector	needle wheel
Quietness	 very quiet	quiet(sucking sound is reduced by muffler)	quite
Bubble quality	 extreme small and very uniform	small and uniform	small and uniform
Energy consumption	 very low	low	 very low
Maintenance	air stone must be periodically (every 4-12 weeks) changed - polluted air stones degrade performance	 Venturi is nearly maintenance free	 nearly maintenance free

Short skimmers for the filter sump

	AquaCareFlotor Model	300A-44	700A-52	1000A-60	1000V-60	2000A-60	2000V-60	3000V-60	3000N-60	
 AquaCareFlotor 700 A	order number	351-003	351-007	351-010	352-010	351-020	352-020	352-029	355-030	
	system	air stone	air stone	air stone	injector	air stone	injector	injector	needle wheel	
	system convertible*	no	no	yes		yes		yes		
	max. aquarium size**, litres / US gal	300 / 80	700 / 180	1.000 / 260		2.000 / 530		3.000 / 800		
	max. height, cm	44	52	60						
	necessary height, cm	46	54	62						
	height outlet, cm	28	27	30				32		
	min. water lever, cm	10								max. 10 cm
	outer diameter, mm	63	75	90		110		140		
	footprint size, mm	140 × 180	150 × 220	170 × 330		170 × 330	200 × 330	300 × 370		
volume foam cup, liters	0.5	0.7	1.4				2.3			
air input, l/h; (at low organic loads ca. 1.2 time more)	80 l/h at ca. 100 mbar	170 l/h at ca. 100 mbar	220 l/h at ca. 150 mbar	-	400 l/h at ca. 150 mbar	-	-	-		
automatically sucked air, l/h	-	-	-	220 l/h	-	400 l/h	500 l/h	250-350 l/h		
inlet water flow, l/h	240	500	700	750	1300		2000			
ozone needs (reef tank), ca. mg/h	5	15	20		40		60			
Advantages of the short skimmers: - Lower energy consumption compared to high models - Low space needs: compact base with space for pump - Operation in filter sump or external - Hang-On bracket available	materials	PVC, ABS, PP, PMMA, NBR, (PA at air stone types)								
	number and size of air stones	1 × Gr. 2	1 × Gr. 2	1 × Gr. 3	-	1 × Gr. 3	-	-	-	
	weight without pump, ca. kg	1.7	2.1	2,6	2.5	3,7	4	9		
	suitable pumps***	Eheim 1046 UP300	Eheim 1048 UP1000	Eheim 1250 UP2000	Eheim 1260 UP3000	Eheim 1260 UP3000	Eheim 1262 UP5000	UP6000 UP11.000e RD6000	UP8000e skimmer	
	water inlet: hose connector or female thread or PVC connector	12/16 nozzle 1/4" female	16/22 nozzle adapter for Eheim + aquabee	16/22 hose nozzle				PVC d20+25 nozzle 20+25	-	
	water outlet (PVC-Fitting mm)	d20	d32			d40		d50		
	order number Hang-On bracket	351-003a	351-007a	351-010a		351-020a		-	-	


other voltage and frequencies on request. Special sizes and equipment are possible. Modifications possible.

* "convertible" means, that the gas inlet system is changable.

** The maximum aquarium volume is calculated for „normal" tanks with living rocks and some fishes. If you have more fish and/or you take much food, you have to choose the next size. The ozone input can vary depending on the number of fish. The needed size depends on many factors: e.g. the wished water quality, fish load, food input, temperature, the kept species, additional technique like bio-filter, UV, ozon. The exact needed size may vary from our recommendation. In complicated cases ask AquaCare please.

*** UP are aquabee pumps; RD is a RedDragon pump

High skimmers with maximum efficiency

	AquaCareFlotor Model	2000A-130	2000V-130	3000A-170	3000V-170	6000V
 <p>AquaCareFlotor 2000A-130 AquaCareFlotor 2000V-130</p>	order number	ACF2000A-130	ACF2000V-130	351-030	353-030	354-020
	system	air stone	injector	air stone	injector	injector
	system convertible ¹⁾	yes		yes		yes
	max. aquarium size, litres / US gal	2000 / 500		3000 / 800		6000 / 1600
	max. height, cm ²⁾	130		170		180
	necessary height, cm	+ 5 cm				
	height outlet, cm	82		125		110
	water level of filter sump	depending on the height of the suction nozzle of the pump used - up to maximum lower edge of the drain pipe				
	outer diameter of main tube, mm	120		140		200
	footprint size, mm	250 × 195		330 × 370		400 × 600
	volume foam cup, liters	2.4 (with drain)		6 (with drain)		7 (with drain)
	air input, l/h; (at low organic loads ca. 1.2 time more)	400 l/h at ca. 150 mbar	-	650 l/h at ca. 150 mbar	-	-
	suitable compressor	Medo 1.6 (29 W)	-	Medo 1.6 (29 W)	-	-
	automatically sucked air, l/h	-	400	-	700	1300 ⁴⁾
	Advantages of the high skimmers: - maximum efficiency - optical evaluation of the organic load possible - water flows up to 240 m ³ /h possible (aks for the professional brochure)	pumped water volume, approx. l/h	1300		2000	
ozone requirement (reef tank), approx mg/h		40		60		120
materials		Acrylic glass = PMMA, PVC, PA, ABS, PE, NBR, silicone				
number and size of air stones		2 × size 3	-	2 × size 3	-	-
weight without pump, ca. kg		6.6	6.0	16		23
suitable pumps ³⁾ (typical load)		UP3.000, 40 W UP5.000e (20 W) RDEco5 130 W (20 W) RD X 40 W (20 W)	UP6.000, 100 W UP11.000e (80 W) RDEco5 130 W (80 W)	UP6.000 UP11.000e	MD55R-5M UP11.000e	MX400
water inlet:		PVC d25		PVC d25 (32)		PVC d40
water outlet		PVC d40		PVC d50		PVC d63

other voltage and frequencies on request. Special sizes and equipment are possible. Modifications possible.

¹⁾ it is possible to change the type of air system later on (venturi/ air wood), ²⁾ special heights are possible; ³⁾ UP is an aquabee term (filter sump operation possible), MD and MX are Iwaki terms (only external operation possible); Red Dragon is a Royal Exclusiv term, ⁴⁾ standard built-in air flow meter, Maximum design size: see remark under low skimmer table.

Skimmer shutdown

for AquaCareFlotoren (and other skimmers) with 1-phase motor (230 V)

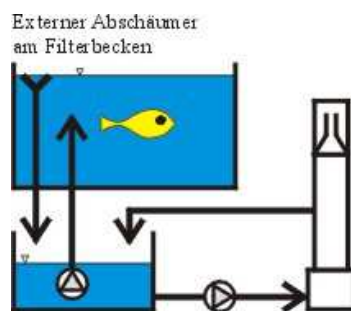
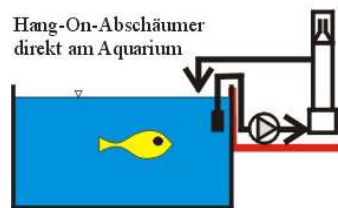
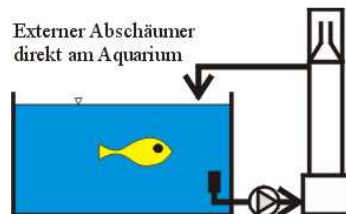
This small circuit prevents the skimmer from overflowing. The device is useful for skimmers that are not operated in the filter sump (external or hang-on).

If the floatate cup is filled, the microcontroller switches off the supply pump or the air pump for the skimmer with a time delay. This ensures that in case of wrong skimmer setting or unexpected overload the skimmer does not overflow and cause flooding.

Maximum switching capacity 500 Watt, dimensions: 130 × 130 × 50, 2 m cable each for float switch, mains supply and consumer. Order number: 600-002



Possible mounting of the skimmer in the aquarium system



High skimmer models can be connected directly to an aquarium. The water is sucked in through a filter basket and pumped through the skimmer. Depending on the structural conditions, the suction pipe can be led through the aquarium or above the aquarium. In the second variant, a venting device must be installed so that the skimmer pump can be put into operation. - From the skimmer, the water flows back into the aquarium without any rise. To minimize the entry of the smallest air bubbles, a filter sponge can be drawn over the drain pipe.

Another direct connection is the Hang-On system: here a low skimmer is hung from the outside of the aquarium by means of a special holder. The connections are made in the same way as for the high models.

Hanging the skimmer directly into the aquarium is another method, but for aesthetic reasons it is not useful for show aquariums, but it is a variant for quarantine, experimental or breeding tanks.

If a filter tank is available under the aquarium or next to the aquarium, the skimmer can either be used as an external skimmer or low models can be operated in the filter sump. If the return water from the skimmer passes through a degassing stage, all small air bubbles are eliminated so that the pump that returns the water from the filter basin to the aquarium pumps only crystal clear water. Alternatively, the return water from the skimmer can be fed directly back into the aquarium. This saves an additional return pump (filter tank-aquarium), but only works with very high skimmers: the drain water must always run downhill.