

Systeme für Aquakultur,
Aquaristik, Labore und
zur Wasseraufbereitung

Systems for aqua culture,
sea water aquaria, labs and
water desalination and purification

Systèmes pour aquacultur,
aquariums eau de mer,
labaratoires et traitements d'eau



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Instruction manual of Fluidized Bed Reactor FBR diameter 250 mm and larger



modifications possible

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1. Safety Instructions

1.1. General information

This manual contains basic information that are important for assembly, operation, and maintenance. This should be read before mounting by the assembly operator and the responsible operator and/or qualified personnel. This instruction must be disposable the at unit at any time.

Pay attention to this safety instruction as well as to the special instructions within the other chapters. In addition local laws and safety instruction must be minded.

1.2. Indication of information



If safety information are important for life or health for persons they are marked with the relevant hazard symbol according DIN 4844-W9.



Safety information marked with this symbol can cause danger for the machine and its function if not respected.



This hints can ease the work with the machine and its maintenance.

At the machine directly marked information as rotation arrow, fluid connections and setting points should be noticed. These marks should be readable at any time.

1.3. Qualification of the personnel

The staff for operation, maintaining, inspection and assembly must be qualified for these work. Responsibility and controlling of the personnel should be directed by the operator.

1.4. Dangers if safety information are not minded

If safety information are not minded persons, environment, and the machine can be endangered. Failure of observe lead to loss of the warranty.

Failure of observe can coarse:

- Failure of important functions of the machine.

- Failure of stipulated methods for maintenance.
- Endanger of persons with electric, chemical or mechanical impacts.

1.5. Safe working

Working with the machine is only allowed if all safety information of this manual, national laws and rules for preventing accidents and internal working, operating and safety rules of the operator must be minded.

1.6. Safety information for the operator

Contact protection for rotating or moving parts should not be removed while operation.

Risks of electrical energy must be averted. Please pay attention to the local laws and information, too.

1.7. Safety information for maintaining and assembling personnel

The operator must take care that all works for assembling, inspecting and maintaining are made by authorized and qualified personnel. These persons must be informed about the machine and the works by reading the manual or otherwise.

Working at the machine is only permitted if unit is out of operation. The described procedure of putting out of operation must be redeemed. Immediately after the work safety and protection facilities must be mounted and put into function.

Before starting again all issues treated in the chapter “putting into operation” must be minded.

1.8. Arbitrary reconstruction and spare parts production

Reconstruction or modifying the unit are only proper if the manufacture agrees. Original spare parts and authorized accessories by the manufacture are made for the safety. The use of other parts can destroy the warranty demands.

1.9. Illegal operation

Safety is only guaranteed if the unit is running within the field of application described in „designated use“ in this manual. The technical limits mentioned in manual (chapter “Technical data and unit protocol”) must be redeemed.

1.10. Linked aggregates

The listed information dealing with safety and operation in manuals of linked aggregates must be redeemed, too.

2. Transport

2.1. Mechanical conditions



The unit may transported only with suitable lifting tools. Pay attention to the transport weight listed in chapter “Technical data and unit protocol”.

Before transporting the unit it must be totally empty (this does not apply to the filter bed granules).

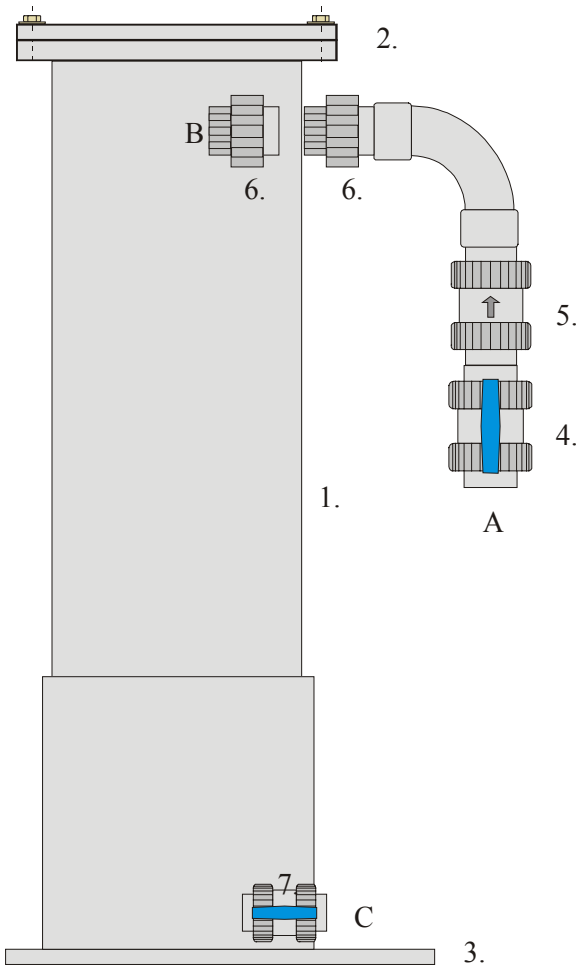
3. Designated use

AquaCare fluidized bed filter are made for treating process water in large aquaria or aqua culture systems. The water should have a salinity between 0 and 40 ppt (promill). If other water qualities are used please contact AquaCare.

4. Configuration

The AquaCare fluidized bed reactor is completely installed, except the filter material and the inlet tube. The unit has to be erected, filled with filter material and connected with water supply.

4.1. Basic equipment



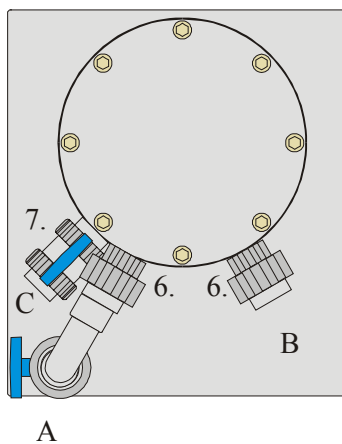
The unit is installed on a stable ground plate and consists of:

1. Main tube (transparent at FBR 250 and 315)
2. upper flange,
3. ground plate;
4. ball valve / butterfly valve for water inlet;
5. check valve;
6. union / flange for water outlet;
7. ball valve for drain (**read instruction carefully!**)

- A. Water inlet (from pump);
- B. Water outlet (to aquarium or LSS);
- C. Drain valve (**read instruction carefully!**)

4.1. Options

Air inlet for intensive aerating the filter bed
electronical flow meter;
electronical pump control.



5. Principle of function

The inlet water (A) is pressed at the bottom into the sand bed – the sand bed will be fluidized. The right flow is controlled visual in the main tube (size 250 and 315) or at the flow meter of the inlet tube. If sand is flushed out at the water outlet (B), the water flow is too high.

After some time a bacterial population, that is doing the biological processes, is established on the surface of the sand particles. If the biofilm gets too thick surplus parts of it will be flushed out by friction forces between the moving sand particles. The surplus bacteria and dirt are leaving the system at the water outlet (B). A sediment filtration is recommended (normally part of the life support system LSS).

The FBR is not able to filter out particles. Possibly some colloidal substances are rejected by the biofilm.

The FBR is able to oxidize organic substances and oxidizes ammonia via nitrite to nitrate (nitrification).

6. Installation

6.1. Setting up



To guarantee a faultlessly operation of the filter the unit should be erected on an even and stable ground. Uneven parts of the floor must be flattened with floor pavement or a suitable base.



If the operation location is over 1000 meter above the sea level the motor must be larger dimensioned to protect it against overheating.

If sunlight reaches the main tube it should be covered with a black foil to prevent algae growth (on for type 250 and 315).



High types should be protected against tipping.

6.2. Water connections

For operating the unit water connections have to be established.



The connection with PVC-U must be glued only with approved adhesion. The processing regulation of the adhesion should be minded.

Please connect the water inlet (A.) with a pump. The right flow is listed in the technical data.

The water outlet (B.) must go back to the LSS or the aquarium. Normally the water will not flow back because a check valve (5.) is mounted

The drain (C.) should not be installed with PVC tubes. The drain is only for drain the sand together with water.

6.3. Electrical connection (if pump is scope of delivery)

The electrical connection must be done by authorized and qualified according with the local regulation only.



Before opening a terminal box and before every disassembling of electrical components the supply voltage must be disconnected at all phases (contact opening minimum 3 mm).

The electrical supply must be conform with the data at the rating plate. The pump must be protected with fuses.



It is useful to connect the motor of the pump with motor protection circuit-breaker to prevent damages.



If the power supply is not stable a voltage guard may be installed. If the phase are not stable a phases guard should be installed.



The rotation direction of the pump must be conform with the arrow at the pump body. If the pump runs in the wrong direction faults can occur. The change the direction of rotating two phase must be interchanged.

6.4. Filling the filter with filter sand

Before filling the filter with filter sand it is important to test the connected system. Leaks are more easier to seal without filter material.



Close the drain (C.).

Open the top of the filter at the upper flange (2.) by unscrewing the screws.

Shut the inner tube with the delivered cap.

Fill in the delivered sand. The maximum filling is marked (type 250 and 315). For the other systems fill up to 50-60% of the total volume. (If you take other sand grains you have to adapt the water flow.)

Take off the cap from the inner tube.

Assemble the flange cap – do not forget the o-ring.



It is very important to screw the M10-plastic bolts with not more than **3 Nm** torque.

7. Start up the unit



Before start up the unit check out if all connections are done well. Make sure that all PVC-unions are tight and their o-ring seals are in the correct position.



Check out if the electrical connection is made correctly.

7.1. Filling with water

Open the inlet ball valve / butterfly valve (4.) a little bit and start the main pump. Use only about 20% of the maximum flow (the flow meter is helpful).

Now the system will be filled with water.

Wait until the outlet water is free of gas bubbles.

Now you may raise the water flow slowly until the maximum flow is reached.

FBR250 and 315: the maximum flow is reached if the sand bed reaches the maximum bed mark about 10 cm below the upper flange (2.).



If sand is flowing out of the outlet, reduce the water flow by throttling the inlet valve (4.).

If you use unwashed sand (standard) please conduct the outlet water to a drain until the water gets clear.

8. Shut down the unit

If you shut down the system stop the water inlet pump simultaneously with closing the inlet valve. Normally the check valve prevents back flowing water. But it is better to play is safe.

A FBR system that is biologically active should never stopped for longer than some hours. If you have to stop it longer you must drain the complete filter sand and you have to store the sand without water but not dry.

To drain the sand filling you must connect the drain (C.) with collecting tray. A hose adaptor is scope of the delivery.



Before draining the filter sand the fluidized bed must be established! Open quickly the drain valve (7.) and shut down the inlet water flow simultaneously.

If the sand is flown out completely flush the main tube (1.) with water until the drained water contains absolutely no sand.

If sand is inside of the ball valve (7.) and you close it, the valve will be destroyed and has to be replaced.

9. Maintain the unit

The AquaCare FBR filter is nearly maintaining-free.

Only the inlet pump should be maintained (see its instruction manual).

10. Trouble shooting

If you cannot fix the technical fault please contact AquaCare.

10.1. The filter bed is blocked

The filter bed may only block if the water inlet flow is too low. The fluidized bed should be established all the time.

Raise the water inlet flow until the bed is unblocked again. If not possible you must open the system and get out the completed filters sand manually with an adequate tool.

If the fluidized bed will not be established please take less filter sand.

10.2. Sand is leaving the system

If sand is leaving the outlet (B.) the water inlet flow is too high or too much sand is filled in the main tube. Take out a part of the sand or reduce the water inlet flow – the fluidized bed must be functional all the time.

10.3. Sand is leaving the inlet if inlet pump is not in operation

Clean the system totally, open inlet valve and check valve and clean them, too.

If sand is gone through the pump, clean it very carefully. Clean all tubes that were in contact with sand.

11. Warranty

You have 24 months warranty on all AquaCare units excepts spare parts like pump bearings and rotors. You have no warranty if parts are broken by violent (for example totally closed water inlet). For consequential losses AquaCare is not liable.

12. Technical data

Size	FBR 250	FBR 315	FBR 400	FBR 630	FBR 800	FBR 1000	FBR 1200
Order number	360-025	360-032	360-040	360-063	360-080	360-100	360-120
max. aquarium size in m ³ ca. at stocking:							
1 kg/m ³ (show aquarium)	75	120	180	440	700	1.000	1.500
10 kg/m ³	15	24	36	88	140	200	300
100 kg/m ³ *	3	5	7	18	28	40	60
Max. water flow in m ³ /h***	2.0...2.4	3.2...3.8	4.8...5.7	11.9...14.2	19...23	30...36	43...52
Max. pressure in bar	0,3						
Diameter in mm	250	315	400	630	800	1000	1200
Erection	External or in filter sump						
Total height in cm**	185 (or special size)						
Necessary height in cm**	200 (ca. 15 cm higher than spezial height)						
Footprint size Wide × Depth in mm	430 × 370	430 × 370	700 × 500	930 × 730	1100 × 900	1300×1100	1500×1300
Materials	PVC, PA screws, NBR		PE-HD black, PA or stainless steel screws, NBR sealing				
Connectors	DN32	DN40	DN40	DN65	DN80	DN100	DN125
Total weight in operation in t, ca.	0.15	0.2	0.3	0.8	1.2	1.9	2.7
Substrate	Sharp edged quartz sand with diameter of 0.4...0.8 mm						
max. substrate filling in t, ca	0.075	0.12	0.2	0.5	0.9	1.3	1.9

* air or oxygen supply is recommended

** spezial sizes are possible

*** depends on sand size and filling quantity

13. Appendix: CE Declaration of conformity

Declaration of conformity in accordance with EMC directive

The company:

AquaCare GmbH & Co. KG
Am Wiesenbusch 11
D-45966 Gladbeck, Germany

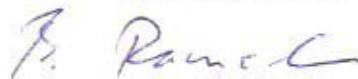
declares, that the product

Fluidized Bed Filter FBR

comply with directive
98/37/EEC and
2001/95/EEC
of the European Community.

Gladbeck, 26.07.2011

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14. Appendix: switch board

15. Appendix: pump