

Installation and operation of the Aquatron systems



AQUATRON®

Phone: +46(0) 10-490 10 40

Email: info@aquatron.se

www.aquatron.se



1. INTRODUCTION

Water is flushed to a separator (without moving parts or power consumption) where urine and water is separated from feces and paper. The water is then lead to a 2-chamber well with an infiltration dimensioned for WC drains.

If necessary a UV-unit or phosphorus trap can be installed to meet high requirements.

The solids is composted in a biochamber.

1. Aquatron uses regular flush toilets.

2. Feces, paper, urine and flushing water are flushed from the toilet to a separator where the liquid is separated to 98%. Separation takes place using the centrifugal force of the water. The separator has no moving parts or energy consumption.

3. Paper and feces fall into the bio-chamber where composting takes place. If compost worms are used, it reduces the volume of about 95%, which gives long emptying intervals. When worms are used, the bio-chamber must be above freezing temperature. The minimum temperature for composting is 15 degrees.

When emptying Aquatron 50, 2x50 and 90 post-composting is needed.

When emptying Aquatron 4x100, 4x200 and 4x300 no postcomposting is needed.

4. At high requirements the liquid flows to a UV unit where it is illuminated with ultraviolet light which effectively kills bacteria or to the phosphorus trap.



I would like to congratulate you on your eco-friendly Aquatron toilet system! Our experience from satisfied customer for over 30 years is that a properly Installed and well maintained Aquatron system works great for many years to come, to the delight of residents and guests.



Anders Welen

IMPORTANT!

In order for your system to function, it is of great importance that installation and maintenance instructions are followed strictly. In case of problems please contact us, we promise to help you!

TECHNICAL SPECIFICATIONS



TOILETS

Any standard WC or urine separating WC. When flushing a normal volume, three toilet chairs can be connected to the same Aquatron separator and eight at the big Separator if you flush at the same time.



PIPING

Pipe length from WC to separator must be at least 100cm but the maximum length is hard to say, there are customers who have more than 60 m.

Pipe inclination: the pipe one meter closest to the separator is usually about 5% (5 cm) and the other length 1% according to the standard.

Pipe dimensions: WC pipe standard Ø 110 mm, pipe out 50-110 mm, ventilation Ø 75-110 mm

INFILTRATION

Aquatron is connected to an approved greywater 2-chamber well capable of 750 liters / day. The infiltration should be dimensioned for WC water.

MATERIAL

Aquatron is made of recyclable polyethylene plastic, and fiberglass reinforced polyester.

LIFE SPAN

Since everything is made of plastic, the estimated service life is at least 50 years.

MAINTENANCE

When the Aquatron system is installed, minimal maintenance is required, however, expect to take a look once a month or quarter depending on the model. Many users have such good decay that they have not emptied anything in ten years in the 4x000 systems. Time between emptying every section is 12-72 months Replace UV lamp after 4-5 years if it is switched on all the time. Replacement of Polonite®in the phosphor trap after about 1 year.

ENERGY CONSUMPTION

None unless you need the UV unit.

UV UNIT

2 UV lamps. If one of the lamps breaks it activates an alarm signal. Electricity consumption: 30 W.

PHOSPHORUS TRAP

Inlet and outlet Ø 50mm. Height of the Inlet / Outlet center : 23/22cm. Included on delivery: Polonite® phosphorus gravel 60 liter.





2. UNPACKING



The following parts are packed inside the biochamber: Separator (upper and lower part), hose clamp Wire-rod, connecting pipe between separator, manifold and turning rod.

3. PREPARATIONS

Following components are needed for installation of the AQUATRON-system. Components marked with an asterisk (*) is included, others are obtained if needed. Use grey pipes as they are UV resistant.

PIPES: WC – Separator	 110 mm x 90° WC-bend with rubber seal 110 mm double socket for connecting the pipes 110 mm manifold for ventilation 110 mm pipes 110 mm bend in different angles Pipe holder for attachment of the pipe. 	
Separator	Connecting pipes 50 mm (*) Manifold 50 mm (*) 90° rörböj, 50 mm (*)	Connects the separators liquid outlet Connects the bio-chambers drainage Connects 2 pipes mentioned above
UV-unit	Siphon (*) Double sock & bends 50 mm pipes 110-50 mm Socket	Included in the UV-unit Depending on the piping Outletpipes if needed From 50mm to 110mm pipe
OTHER	Aquatron module for drainage (Wood or styrofoam for platform	

4. INSTALLATION OF THE SYSTEM

4.1 Biochamber

- 4.1.1 Build a platfrom for the bio-chamber with wood or styrofoam according to the instructions. Place the bio-chamber on the platform so that i stands firmly.
- 4.1.2 Inspect the location. The biochamber must not be in a room with vacuum (e.g. mechanical ventilation).
- 4.1.3 The space for the Aquatron plant should be frost free and the minimum composting temperature is 15° C If necessary, insulate the space and install thermostatically controlled element or heating cable.

If you use UV-unit / phosphor trap without keeping it frost free, the water and phosphor trap will freeze and it will not be able to flush, but nothing will break down when freezing.



4.2 INSTALLATION OF THE SEPARATOR

4.2.1

Assemble the two parts of the separator. Make sure that the wire rod bottoms in the wider section of the separators neck and that the wires are not crossed. The cyclone shall rest against the wirerod. After that tighten the hose clamp so that the top and bottom part is held together. There must be no gap between the cyclone and the wirerod.

4.2.2

Place the separator on the biochamber with the bottomparts outletpipe facing to the side of the biochamber. Turn the top part in direction to the connecting pipe for the WC. Make sure that the separators top part is resting against the wirerod and tighten the clamp hose so that the separator is fixed in place.

4.2.3

The separator must be installed so that the vertical line i straight.

4.2.4

If the biochamber is tilted use Aquatron adjustable plate.



The wires should be appoximately 10mm inward angled.



Adjustable plate can be used when the biochamber is tilted.



Figure 4: Separator installation

NOTE!

Only the WC should be connected to the Aquatron system to ensure good separation. A dripping sink causes the water to run so slowly that the separation can become worse.

There are several installations where the entire household drain is connected to the separator but then careful monitoring of the system is required so that the biochamber does not get too wet. If using a greywater system this must be connected after the Aquatron system.



- 4.5.1 110mm pipes are use between WC and separator. For venting, 75 to 110mm pipes are used.
- 4.5.2 The separator is connected to a 110mm double socket. The separator must be straight both horizontal & vertical. The inlet must be pushed all the way in the socket.
- 4.5.3 The horizontal distance between the WC and the separator must be at least 80cm for the water to get the right movement to get good separation.

The last meter (closest to the separator), the pipe must have an angle of about 5% (5 cm), sometimes less depending on the previous fall height of the pipes from the toilet (you try your way during installation). Otherwise, the horizontal slope shall be approximately 1% on sewage pipes.

Check that there are no dips on the drainage pipes in the house where it can accumulate and stop or that paper and faeces stand still and dissolve into a soup that cannot be separated in the separator.

- 4.5.4 The ventilation is connected to a manifold between the WC chair and the separator. The ventilation pipe is led up over the roof, use a 50mm pipe at the last bit to prevent flies (flies have difficulty flying in a 50mm tube).
- 4.5.5 If there is a large level difference between the WC and the separator inlet try to save a distance at the end before the separator so that the correct speed can be tuned with the slope of the pipe. You can also raise the entire biochamber.
- 4.5.6 Use the supplied 50mm fittings to connect the separator with the drainage in the biochamber.
- 4.5.7 Spend a lot of time getting a good angle on the pipe for the separator to get a good separation.





4.5.7 Trim the separator

Place an empty bucket under the separator in the biochamber and flush the toilet. Measure how much water it gets in the bucket.

Strive to get as little as possible (a tablespoon can be obtained, in some difficult cases a dl.

It is normal for a few drops at the beginning and end of the flushing water to enter the bucket.

If it comes alot of water in the beginning of the flush, the speed is to high. When it comes alot at the end the speed is to slow.

Sometimes you have to compromise if there are several toilets installed at different speeds.









4.3 INSTALLATION OF THE UV-UNIT

- 4.3.1 The UV unit is placed so that the liquid from the separator and the biochamber can flow directly to it. Make sure that the aluminum sheet is placed so that it can be unscrewed and release the luminaire for repla cing UV pipes, supervision and cleaning. If it is tight, saw the top of the tub so that you can lift the UV straight out of the tub.
- 4.3.2 The UV unit must be placed horizontally for best function.
- 4.3.3 Under the UV unit, the enclosed water trap is installed which is connected to the existing drain so that no odor comes from the sludge well. Make sure the water trap is supported underneath.
- 4.3.4 The UV unit is connected to a 230V grounded outlet.
- 4.3.5 The UV unit's lamps are of the type UV-C and can be purchased as a spare part, the service life is about 4-5 years. For example, the following:
 PHILIPS, typ TUV 15
 OSRAM, typ HNS
- 4.3.6 The UV device only needs to be on when the liquid flows through it, to save energy you can turn it off. The energy consumption is 30 watts.
- 4.3.6 The UV unit can handle 250 liters per hour, so if you want to remove all bacteria in your wastewater, you can place it so that all the water goes through it.

Example: Pallet for UV Unit





Material list: (all dimensions in millimeters)

1. Sides, 4 pcs

A: 95 x 20 x 300, 3 pcs

B: 60 x 20 x 300. 1 pcs

2. Feet, 4 pcs

80 x 80 x 120

3. Sideboard lowered 55 mm

To allow room for the 50 mm drainage pipe from the UV unit.



Phone: +46(0) 10-490 10 40

Email: info@aquatron.se

www.aquatron.se

AQUATRON

AQUATRON PHOSPGORUS TRAP



If there are high demands on phosphorus purification, one can choose to use a phosphorus trap or urine separation. Phosphorus traps can be either Chemical in the sludge well or a phosphor filter with Polonite gravel. This is a complement to a biological treatment, for example a soil bed.

Aquatron's phosphor filter is easy to handle yourself.

A normal phosphorus trap is 10 times the size and is considerably more expensive in the purchase and exchange of phosphorus-binding material (must have a crane truck for changing the material). As only the flushing water passes through the phosphorus trap, the volume can be reduced by 90%. The optimum is to have as high a concentration of urine as possible (where all phosphorus is) and to avoid as much plain water as possible as it only leaches out the phosphorus-binding material.

Make sure to mount the phosphor trap so that it is easy to replace the Polonite gravel after about a year.

Put the used Polonite in the compost to remove any bacteria.

You can spread the used Polonite onto the yard and return the phosphor afterwards with your own local cycle after composting

The Polonite comes in two buckets each 30 liters.





4.5.7 Ventilation

The ventilation from the Aquatron system can be placed at any place between WC and the separator. Make sure you have as few bends as possible and use as wide pipes as possible to get a good pull. If necessary, you can put on power amplifiers such as an electric or wind fan.





NOTE!

Vacuum valve must not be used.

The WC ventilation is drawn in its own pipe over the roof nock and must not be connected with the ventilation for the house otherwise as this can cause odor problems, keep in mind that large amounts of snow can clog the ventilation.



6.2 Pumping solution

Pump can be used when you do not naturally get fall within the system, remember not to pump before the separator because then all liquid and separation becomes poor.

Over the years, we have come to the conclusion that Saniflos pump Sanivite is reliable and easy to use.

The sanivite pump is installed between the outlet of the biochamber and the phosphor trap or the inlet of the UV unit.

For the Sanivite pump to start, about 10 cm of water level is required from the bottom of the pump, keep this in mind when installing.

Clean the pump once a year or flush with plenty of water to clean itself.

Over time you get a coating of urine in the pump which is easily removed by opening the pump.

NOTE! To prevent the liquid from splashing on the fluorescent lamps, a 45 ° angle should be mounted on the inside of the UV unit inlet. The pipe angle is directed towards the bottom of the UV box.







Maintenance Instructions

Separator

The task of the separator is to separate liquid from solids and paper. In the middle of the separator is a wirerod. Its task is to control paper and ssolids so that they fall into the biochamber.

The system should be placed in such a way that it is easy to inspect and manage the various parts of the system.

There is a lid on the top of the separator. This cover can be removed to allow inspection. Sometimes paper can get stuck in the wirerod. Remove the cover and peel down the paper with a stick or similar. Too soft paper can get stuck early. There is then a risk that separation becomes bad and water getting into the biochamber. To avoid this, change to other paper.

Depending on water quality, coatings may occur. Therefore, make it a habit to inspect the separator at least once a year. Make sure there is no coating on the inside of the separator or on the wirerod. If so, remove the various parts and clean them with a brush.

Check if the separator is properly aligned so that the separation is optimal

The wirerod may need to be replaced after a few years due to corrosive water.

UV-Unit

Aquatron UV light is very effective. The flushing water is illuminated as it seeps into the outlet, killing the bacteria. After a period of use, there may be coating on the inside of the UV tub. Make it a habit to remove the UV fixture at least once a year and clean it with a brush.

The water lock should be cleaned annually.

If a UV fluorescent lamp breaks, an alarm is heard. Then unplug the power plug, unscrew the protective plate and pull out the luminaire. The UV tube can then be replaced.

Ventilation

Normally there is no odor from the system. This is because urine has been separated and there is ventilation. The biological process that takes place in the biochamber generates heat, which in turn requires oxygen. Air is therefore drawn to the bio chamber and then vented out through the separator and ventilation.

Keep in mind that strong bends or narrow ventilation pipes obstruct the air, while a tall and straight pipe with a large diameter (110 mm) promotes ventilation.

If necessary, you can supplement with a carbon filter to remove the odor on the ventilation.







What happens in the biochamber?

In principle, it is a composting process that is ongoing in the biochamber. The process breaks down the organic material (faeces, toilet paper and in some cases also food waste), which ends up there in water, carbon dioxide and nutrients. At the same time, heat is emitted. The process can be described as follows.

Organic material + Oxygen -> Water + carbon dioxide + nutrients (phosphor, nitrogen etc) + heat.

Those who do the job are different types of microorganisms; bacteria, microscopic fungi and radiation fungi. When the microorganisms break down the material, other actors, such as worms and insects, can further process the material and make it an even better product. The worms can also, through their activity, give the microorganisms better conditions to function, for example by making the material more airy.

Important for the process to work

For the process in the molding room to run smoothly, the following conditions must be met. It should be:

• *enough oxygen* (see formula above) in the pulp so that bacteria can breathe. Without oxygen, the wrong type of microorganisms takes over, the process goes worse and it often results in bad odors, flies, etc.

 \cdot *just enough with water*. If it is too dry, the material is preserved. If it is too soft and muddy, it will get too little oxygen into the pulp.

· Balance between nutrient-rich and nutrient-poor materials.

In the Aquatron separator, most of the flushing water and urine are separated aside. This also separates most of the nitrogen (contained in the urine). Small amounts of liquid will end up in the composting compartments.

It is therefore important that the drainage holes in the bottom of the compartments are covered with the drainage module.

Composting compartments are different depending on the model.

Aquatron 50, 2x50 & 90 has a pull-out box. At the back there is a grid and there is excess liquid drained. The box can either be emptied into suitable containers for post-composting, or replaced with a new box and allow post-composting to take place in the old box.

Aquatron 4x100/ 200/300 The is the pre-molding compartment divided into an inner and an outer container. The inner container is divided into four chambers with holes in the bottom. Through the holes, the excess liquid is drained into the outer container. When a chamber is filled, turn to the next chamber by turning the bar on the top of the container. Emptying is only done when the last chamber is taken into use or is filled. It is good to change the trays diagonally to maintain good weight distrubution.

How shall the composting compartments be maintained?

When a new compartment is taken into use.

Each time a compartment or biochamber is used for the first time, or after emptying, an approximately 5 cm thick layer of food soil or compost should be laid at the bottom.

For the Aquatron 4x models, it is not necessary to empty a compartment every time you have turned the lap in the biochamber. Usually, the material amount should have decreased to 10-20% of the original amount. There is normally room for one more round before the compartment needs to be emptied.



Handle the cone in the bio tank

Under the separator, a cone is built up of solids and toilet paper. To prevent the cone from being built up in the separator, the compartment (applies to the 4x models) should occasionally be moved slightly to the side with the spinning bar, so that a new cone is built up alongside the former.

Alternatively, the cow can be overturned with the help of suitable tools (applies to all models).

This provides both more efficient use of the compartment and better conditions for the degradation process. How often the transfer / overturning of the toilet should be done depends on how much the toilet is used. This is usually learned after a period of use.

Checking the resting composting compartments

Occasionally, the resting compartments (post-composting container) should be checked. A suitable frequency of control may be once a month or every two months. If the material has started to dry, the degradation process stops. Therefore, you may want to shower the material using, for example, a watering can.

Add composting mask

One way to stimulate the degradation process in the composting compartment is to add compost worms. The mask is excellent in latrine. It makes the material more airy and processes it to make it a nicer end result. Mask is preferably added to the two first used compartments (applies to the 4x model) when used for some time. Then the mask spreads itself to the other compartments.

In order for the mask to be able to winter, it should be avoided, if possible, that the material in the compartments freezes during the winter. There should be at least some part of the room where the temperature is higher than the freezing point, so that the worms have somewhere to take the road when it starts to freeze. The material must also not dry out or become so wet that there is water in the compost compartment (happens if the drainage does not work).

Feel free to add some food waste

In the separator, the urine and most of the nutrients are separated by the flushing water. Sometimes adding some food waste, such as potato peel, leftover salad or likewise is a good way to add a little more nutrition to the material and give the microorganisms good conditions.

Emptying

When the biochamber or all compartments have been filled, it is time for emptying. Emptying can be done using a shovel, bucket or similar.

Regarding the 4x models: If the material, which is the normal, has been in the compartment for more than six months since the last refill, the material can be used as you wish. It can be buried in the ground, put in a garden compost or used / placed in another way, as you see fit.

If the time is shorter than six months, it should be post-composted in a latrine compost.

If you have a mask in the compartment, the drainage should be done by scraping off layer after layer at a slow rate. The mask then makes its was down into the material. Most worms are collected in the bottom set, which is conveniently lifted over to the last filled compartment. In this way, the mask culture is secured in that compartment or in the cleaned container.

URINE SEPARATION



If you use the Aquatron with a urine separating toilet this gives you the perfect cycle and the most environmentally friendly option plus you don't have to worry at all about Sludge emptying by truck.

The greywater sludge well can easily be managed by yourself.

Make sure you install the urinepipes with good decent without dips to prevent future problems with stopping. The urine forms crystals stationary for too long.

The appropriate size of urine tank is 900-3000 liters depending on whether it's full-time or a holiday home.

Contact us with questions about installation and we will be happy to help.





Exempel: Urine separating WC Ecoflush

www.aquatron.se

7. MAINTENANCE INSTRUCTIONS



It may be advisable to look at Aquatron systems in operation about once a month. By detecting any deviations early and then immediately correcting them, many corrections can be made much easier than if a minor operating deviation had to "build" itself into a serious operational malfunction.

7.2 Separator

On the top of the separator is a lid that can be removed to allow inspection. Sometimes paper can get stuck in the wirerod. Remove the lid and remove the the paper with a stick or similar. Anything that is too soft can get caught in the wirerod, which means that too much water will fall into the cinema chamber. To avoid this, one should switch to another type of paper. Depending on the water quality, coatings may occur. It is advisable to check once a year. For heavy coating, remove the various parts and clean with a brush.

It is usually a disadvantage to have low flushing toilets as there is easier for a stop to occur in the pipes. Paper and faeces that have stood still dissolve into a soup that cannot be separated properly.

7.3 Maintenance and drainage of the Biochamber

Regularly check the drainage and texture of the compost in the biochamber. Make sure that a paper pile does not build up in the chamber, as this may cause a stop in the separator. If so, break down the pillar with a suitable tool or twist the compartment slightly. Also add a little garden compost to bring in bacteria / microorganisms, then the composting process will start faster. Suitable material is Aquatron's drainage mat.

7.4 Composting

In order to get a good composting, a good carbon / nitrogen balance is required. In a latrine compost, carbon is mainly derived from toilet paper and bedding such as sawdust; while the nitrogen is in the faeces. In the Aquatron systems, a good carbon / nitrogen balance is obtained in normal use of toilet paper. However, if the compost on the properly installed separator and the correct drainage is wet, it may be due to too little carbon. Then spread bedding, such as wood pellets or sawdust, over the compost.

7.5 Compostworms

To speed up the degradation of the compost and greatly reduce the amount of compost (the amount of waste is reduced in volume by about 90%), the compost worm of the variety Esenia Foetida can be used. The mask is added after a few weeks of using the toilet system. The mask can be purchased in most stores that deal with composting products or by Aquatron. This type of composting works best in temperatures between +12 and + 25 ° C. For permanent housing, the temperature should exceed + 15 ° C in the room where the bio-chamber is located. At temperatures below + 10 ° C, the mask's activity decreases and nutrition lasts longer, which is an advantage in holiday homes that remain uninhabited for a longer period of time.

NOTE: The biochamber should be frost-free for the worms to survive, it sometimes works anyway!

7.6 Emptying a compartment in the biochamber

When the first used composting compartment has arrived at the discharge hatch, the composted material can easily be removed using a bucket or small shovel. Leave a bottom layer of about 5 cm to maintain the drainage bed unless the layer needs to be renewed. Post-composting may be required under abnormal loads or under bad composting conditions.

In this case, this should be done in a compost container with a closed bottom to avoid any leakage.

7.7 UV-Unit

When one of the fluorescent lamps is broken, a buzzer sounds from the luminaire. Pending installation of new fluorescent lamps', the toilet can still be used, since one fluorescent lamp is sufficient for full function. Both fluorescent lamps however, should be changed at the same time. NOTE: Always unplug before removing the cover of the UV unit.

When changing, it may be advisable to clean the UV tub inside.

Also check that the water trap under the UV unit is clean and that no dirt is stuck in the outlet.

AQUATRON

8. TROUBLESHOOTING



TYPE OF ERROR	REASON	HOW TO FIX
8.1. Wet compartment -		Check that the drainage holes are not clogged and that the drainage bed works
	- To much water	A: Check that the separators top part has a straight horizontal & vertical line
		 B: Make sure the wire rod is fitted correctly and that non of the threads are against the inside of the separators neck, the threads should have an incline of about 10mm. C: Check that no paper is stuck in the wirerod. D: Make sure the top part is fitted well against the wirerod.
	- Flushing produces waves	E: Check the inclination of the inlet pipe. If the slope is too high liquid will enter the biochamber at the beginning of the flushing, if the slope is too small liquid will enter at the end, Check that there are no gaps on the inlet pipe
	- Leaking WC	F: WC flushing mechanism is cleaned or repai ed.
8.2 Smell around the system – Wet Compartment		See above
	- Bad ventilation	 A: The ventilation pipe is too short, does not reach over roof. B: The ventilation is connected to other ventilation in the House. NOTE: vacuum valve must not be used! C: Ventilation goes the wrong way.
8.3 Smell when windy	- air is pressed down Into the ventilation	Ventilation does not go high enough over roof, can be provided with electric or wind fan.
8.4 Clogged Separator	- Too high waste pile In the biochamber	Push the pile with suitable tool or turn the compartment slightly if its a 4*000 system.
	- Wires Wire rod is bent or Paper i stuck	Straighten the wires, feel if the wires have become rough, then paper gets caught easier, replace wirerod.
	- Stop in the outlet after the biochamber	Check if the is any stop.
8.5 Blockage in the sewage - Deposits or objects In the outlet		Check that no object stopps the water in the UV- unit or the siphon under. Clean and remove any potential deposits or objects.
8.7 Flies in the biochamber	- Wet compartment	See image 8.1 och 8.2 above. Spray the inside of the biochamber clean wiht insecticide Check the net on top of the ventilationpipe. Put a 50mm pipe in the end to prevent the flies (they can't fly in it!) Use wood pellets to soak up the liquid if it is too wet.

www.aquatron.se



Warranty 1 or 5 years on your Aquatronsystem.

The warranty covers material (not work) and is valid for 1 years, if you submit your customer information to us the warranty is for 5 years from the purchase. The warranty is valid only if a receipt can be presented at complaint.

The manufacturer shall not be liable for defects arising from anything other than normal use, including malpractice, in the event of incorrect installation, during repair performed by a repairer not instructed by the supplier or during a lightning strike or other electrical disturbance.

The warranty does not apply to consumables such as UV fluorescent lamps, wirerod and phosphorous gravel.

In the event of a complaint, the buyer should contact the manufacturer Aquatron International AB or the dealer where the system was purchased.

The buyer must at his own risk and expense send the complained product to the place decided by the manufacturer.

A new part is then sent free of charge to the buyer's nearest post office or freight station.

Send your customer information to us by mail or E-mail and you will receive a 5 year warranty.

Aquatron International AB Ekebyvägen 4 725 92 Västerås Sweden

Phone: +46(0) 21-490 10 40

Email: info@aquatron.se

9.