Table of Contents

1 Read this first

Application of this instruction manual

This instruction manual provides the installer of this plant, its owner and the expert personnel with some important information regarding installation and maintenance of the plant and general information regarding its safe operation.

Use

The described plant shall only be operated for its intended purpose of use within the defined field of application. For filtration of special liquids and any use in the industrial field, the manufacturer shall be consulted.

Intended purpose of use

The Smartpond® continuous belt filters are generally intended for use in cleaning and filtration of solids from liquids. Field of application includes industries, fish farming, sewage treatment plants and fish and swimming ponds.

Liability

If the plant is operated for a purpose beyond the field of application or if it is modified, it would no longer be considered in use for the intended purpose. In such cases, the manufacturer will not accept any liability.
We recommend the settings ‘‘dry-run protection with S-version’’ and ‘‘overflow protection with G-version’’ for high pumping output.

Dismantling and disassembling

The dismantling or disassembling of a Smartpond® filter plant shall only be carried out by an authorised Smartpond® retailer or qualified personnel or with their consent/instructions.

Safety

Before opening the terminal box cover, make sure to disconnect the power cable from the mains!

1.1 Symbols and used terms

	**Warning**	This symbol gives a warning message which, if ignored, could lead to injuries or substantial property damage This warning message shall be taken seriously in any case!
	**Instruction**	This symbol draws your attention to important information. When ignored, damage to the plant or errors may be caused.
	**G-Model**	Text or description which relates to the G-Model (pumped version)
	**S-Model**	Text or description which relates to the S-Model (gravity version)

Plant	Complete Smartpond®Filter equipment as described in this instruction manual.
Guarantee	For guarantee claims, it is important to leave the plant unmodified in its original state and frost-proof (verifiable). Any modification, adjustments, upgrading etc of the plant would lead to loss of guarantee claims.
Owner of the plant	The person or firm that owns the plant and is responsible for its operation and maintenance.
Skilled personnel	People who are trained for carrying out installation and maintenance work. People who are aware of the potential dangers associated with use of the plant and have the required tools and resources available at their disposal.
Assembly work	All the work procedures and measures required for safe and proper commissioning of the plant.
Error	The operating state which limits the operation of the plant or makes its impossible.

1.2 Responsibilities

Obligations of the owner

The owner of the plant shall assure that:

- the plant is kept in a safe operating state,
- this instruction manual is provided to the expert staff members,
- maintenance work is carried out on the plant after regular time intervals.

Responsibility

Only expert personnel shall take charge of the following tasks:

- installation
- connecting the electrical components
- setting the electrical components
- the maintenance work

Manufacturer

Name	AquaFil GmbH
Address	Stuben14, 6030 Ebikon
Country	Switzerland
Contact	www.AquaFil.org

Local retailer / Sub-supplier / Distributer

(Factory label)

2 Technical Data

See www.AquaFil.org : Click on Filter and selected the desired type: “Explosionszeichnung” (exploded assembly drawing)

2.1 Control unit box

2.1.1 Control elements

⚠	**Warning**	Before opening the terminal box cover, make sure to disconnect the power cable from the mains!

With the push button T1, the spraying pump AND the conveyor belt can be manually controlled.
If only the conveyor belt has to be driven, the plug of the spraying pump shall then be disconnected. As long as the button is pressed, the conveyor belt will keep moving.

For testing the spraying pump (likewise with push button T1), disturbance would not be caused normally if the conveyor belt moves alongside.

If only the spraying pump has to be tested, the plug can be inserted into the spare power socket or the plug from the engine of the conveyor belt has to be removed (for this, the cover box must be removed from the engine first).

2.1.2 Mounting of the control unit box

The screws for mounting are provided in the control unit box.

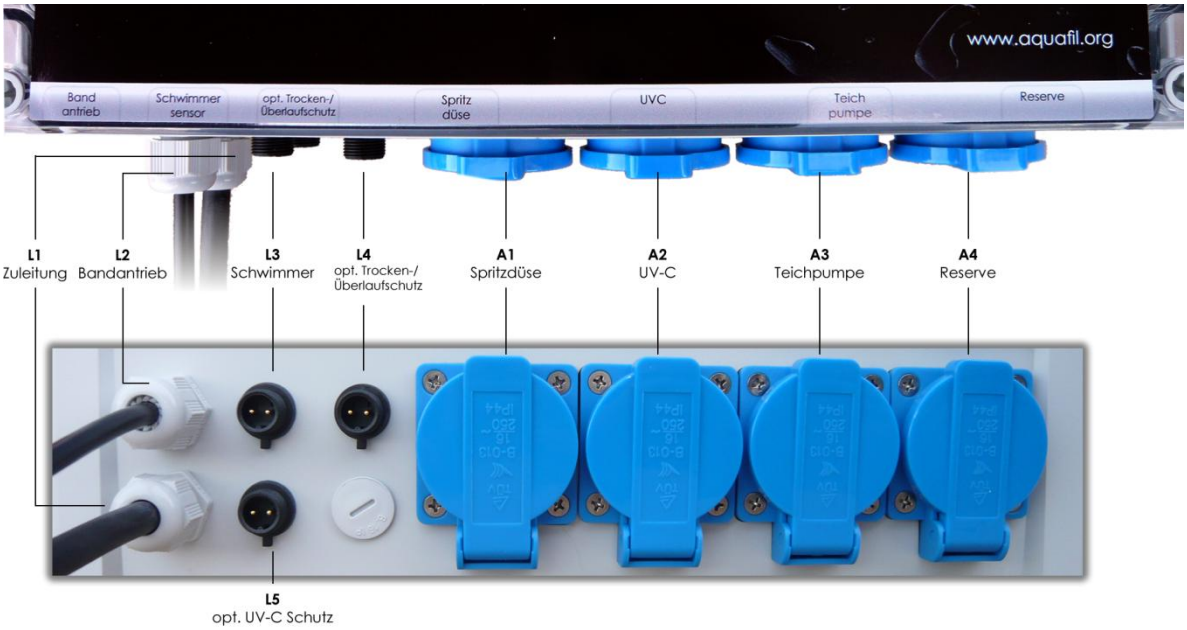
For mounting the control unit box in the plant, there are two possible ways to proceed:

Pos. front

Pos. right

2.1.3 Power outputs

Lower side of the control unit box



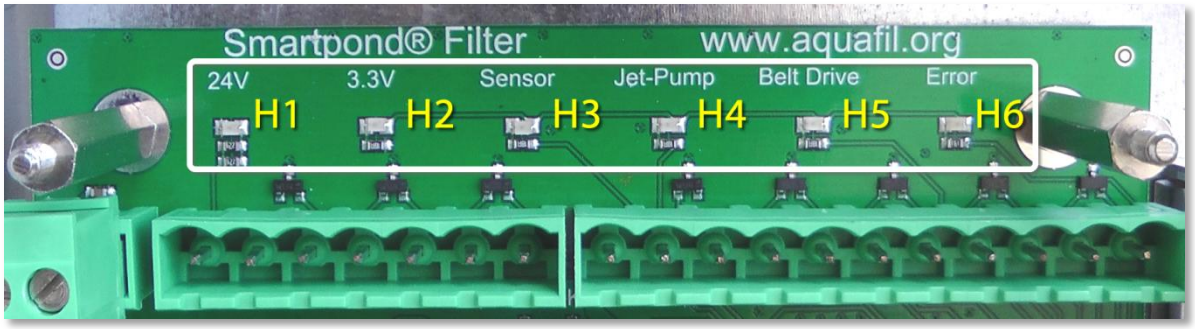
At the lower side of the control cabinet, the cable outputs are visible on the left side (L1 – L5):

L1 Lead for control unit box	Please insert in a 220VAC socket, which is secured with a FI protective switch.
L2 Lead for belt drive	This cable is connected with the 24VDC motor in the motor box through the 2 pole crimp connector.
L3 Float gauge sensor	With this 2 pole connector, the float gauge level B1 is connected through the soldered 2 pole socket (insert and tighten the connecting nuts securely).
L4 Option: Dry running/ Overflow protection	When the option ‘‘Dry running / Overflow protection’’ is selected, the float gauge B4 is connected with this 2 pole connector through the pole soldered socket (insert and tighten the connecting nuts securely).
L5 Option UV-C Switch	When the option UVC-circuit is ordered, the protective switch B2 is connected with this 2 pole connector through the soldered 2-pole socket (insert and tighten the connecting nuts securely).

Attention	When the leads L3 to L5 are plugged in, it shall be made sure that the correct signal generator (float gauge, switch etc.) is connected to the respective connector.

2.1.4 Control unit circuit board

On the control unit circuit board, several LEDs (H1-H6) are available for control purposes. They are visible all the time through the closed transparent cover of the control unit box:



Picture control LED's

H1
24V
Supply voltage 24VDC
(must light up during operation)

H2
3.3V
Internal circuit board voltage 3.3VDC
(must light up during operation)

H3
Float gauge sensor
Lights green when the float gauge sensor (B1) is active.

H4
Pump
Lights green when the power socket output for ''spraying pump'' is triggered/activated.

H5
Belt drive
Lights green when the output for belt drive is triggered.

H6
Error
Lights red when the belt drive motor overloads (after 5 attempts).
Reset error by pushing the manual control (push button T1 – *page 5*)

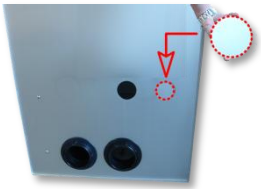
3 Model EBF

3.1 Application

The Pumped version is ideal for koi pond and pond owners who have installed a pump directly in their pond or in a collecting chamber and pump the contaminated water into the filter. In this system the outlet of the biological stage lies above the pond level. The water flows back into the pond according to the principal of gravity.

The Gravity version is suitable for koi and pond owners who have installed floor drains and/or float gauges in their pond. With this system, the pond water flows directly through large pipes into the Smartpond® filter by gravity. With a pump the cleaned water is again pumped back into the pond.

3.2 Delivery form



The plants are delivered in completely assembled state.
The unused tank ducts can be sealed from inside with silicone and the discs delivered alongside.
(see picture)

3.3 Installation

3.3.1 Mechanical installation

Instruction	The filter must be installed frost-free. If this is not done, no guarantee can be claimed for damage cause by frost.

The filter must be positioned on a plain and solid foundation. Ideally, the filter is placed on a thin Styrofoam /Styrodur layer. This would provide an even surface and prevent scratches from appearing on the filter base.

Instruction	It must be assured that the backflow to the pond takes place through an adequate number of pipes to prevent build-up of backwater in the filter.

Instruction	The upper edge of the filter is positioned 10 cm higher than the pond water level. 10 cm is the minimum value and the filter shall not be positioned lower than this. In order to comply with this value, the pond shall have an overflow outlet. If the filter is installed more than 10 cm above the water level in the pond, the filtration efficiency will fall. Ideally, the maximum water level in the pond shall be limited through an overflow outlet.

Filter inputs	The filters are equipped with welded pipe sockets for D110mm pipes.

Every intake point to the filter shall be fitted with slide or ball valves.

For the G-Version or high pumping outputs, the water shall be distributed in several inflow pipe sockets so that it can reach the filter quietly.

Filter outputs

The Smartpond® continuous belt filters are delivered together with D 110mm tank screws for the return flow. Further a drill hole (or even a second one depending on the model) is present for screw joints with D 75mm. The PVC screw joint for this is not provided in the delivery package.

In the PVC tank screws, short pipe fittings shall be bonded onto so that pipes having a sealing ring can easily be pushed onto. Like this disassembly of the inlets is assured without having to saw off any pipes.

Instruction

It shall be assured in particular that the water feedback system to the pond is large enough to prevent build-up of backwater in the filter.

In order to maintain a certain water level in the bio-stage for biological organisms, the bio-stage outlets are turned upwards with a 90° elbow, and with a T-joint, the pond is re-conected. The height relations of the T-joint determine the water level in the bio-stage (see picture).

T-Drain pipe to the pond
(not included in the delivery package)

The height from the ground to centre of the T-drain pipe shall be set to approx. 40–45 cm (30-35cm for EBF ECO).

Overflow pipe

In the filter, an overflow pipe shall also be installed with a height of up to 65 cm above ground level. This serves as overflow prevention in case if the filter basket in the bio-stage is clogged with sludge. The safety opening at the top shall be not covered with any filter basket or the like but must rather remain completely open.

Positioning of the pond pumps	Feed pumps can be set up In the bio-stage or outside the filter ‘‘dryly’’. In order to keep biological organisms away from the pumps, a slotted pipe can also be delivered optionally.

Dirty water drain

The dirty water drain is present at the right side of the filter. Please take this into consideration during the planning.

Dirty water drain with 110 mm elbow

Setting of the safety overflow

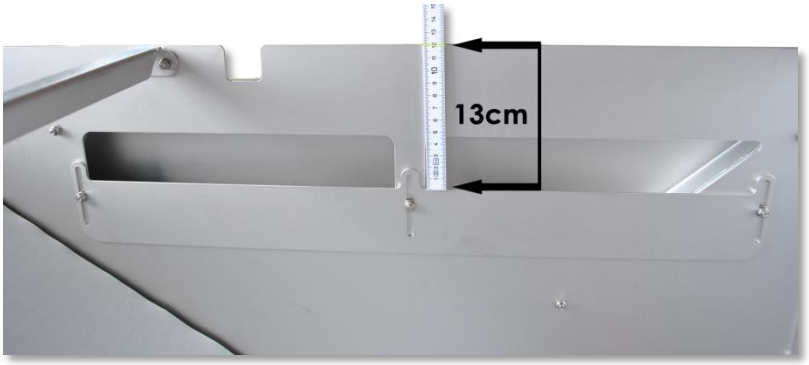
With the overflow plate mounted in the filter, emergency water supply can be adjusted for the pumps and biological life.

Function

If the contaminated filter belt cannot be driven further for some reason, the water level in the filter module will increase and the pond water will rise above the overflow plate in the bio-pond.

Setting

The overflow slit shall be kept as wide as possible. The overflow edge of the overflow plate is positioned around 1 cm above the water level in the filter (before the flushing process begins) and tightly screwed. The factory default setting is 13 cm as shown in the picture below.



3.3.2 Electrical installation

⚠	**Warning**	Before handling the filter, the power plug shall be drawn out of the main power supply socket for safety reasons.

The filter is delivered in mounted and operational mode. The control unit box must be protected from rain/water and moisture and hung up in frost-free surroundings.

⚠	**Warning**	FI switch: With regard to electrical installation of the plant, it must be assured that the power supply is passed through a residual-current circuit breaker

The switch in the control unit box is designed for a total of 16 A of current.

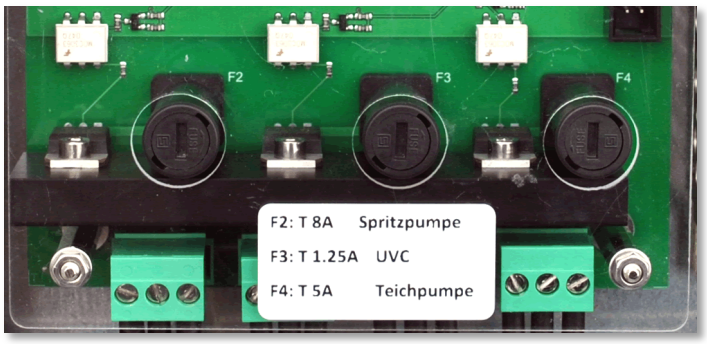
💡	**Instruction**	In order to guarantee the safety functions, the pond pumps and pressure pump as well as the optional immersing UV-C shall be directly connected to the control unit box.

3.4 Commissioning

After the filter has been properly positioned, all supply and return pipes have been installed and ca. 40cm water has been allowed to enter, the power cable can be connected with the mains.

4 Local settings

Fuses for the power sockets in the control unit box



F2 spraying pump – T 8A
F3 UVC – T 1.25A
F4 pond pump – T 5A

⚠	**Warning**	Only use slow-blow fuses (5x20mm)!

4.1 Running times

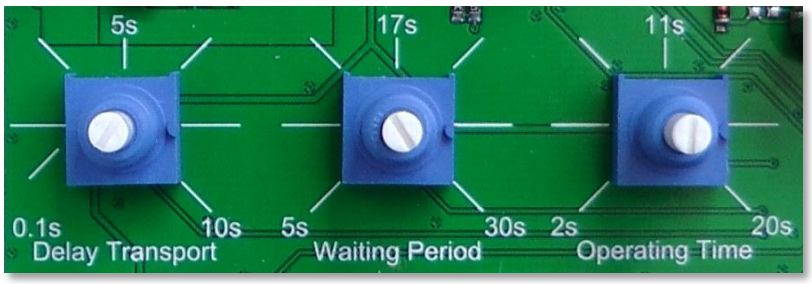
The feed times etc are adjusted in the control unit box using three potentiometers according to the conditions of the local pond area.

Warning	Before the control unit box is opened, the supply cable is disconnected from the power socket!

3 Potentiometers

On the Smartpond® circuit board, there are three potentiometers with the following designations:

P1 Left	P2 Centre	P3 Right
Delay of the pump	Waiting time	Running time



P1 **P2** **P3**

Functioning of the control unit

Start of the cleaning cycle
B1 (float gauge)

When the fault gauge sensor B1 is pressed, the cleaning cycle begins. The spraying pump is triggered for this purpose (Output A2 = power socket for spraying pump).

Delay of the pump
P1

After a fixed delay time of 1 sec, the time P1 begins (delay of the pump) which can be adjusted between from 0.1 to 10 sec.
Default setting ex factory: 0.1 Sec. = minimum; left-hand limit stop

After this time lapses, the conveyor belt starts moving (Lead L2)

Running time of the conveyor belt
P3

The conveyor belt runs for a specific running time (P3) which can be varied between 2 and 20 sec.
Default setting ex factory: ca. 11 sec. = Mean (ca. 12:00)

End of the cleaning cycle

After the P3 time period lapses, the conveyor belt stops to move. But the spraying pump operates for a fixed programmed time of 1 sec longer so that no dirt remains on the belt or reaches the clean bio-chamber.

Waiting time till the next cycle possible
P2

After the spray nozzle stops, the delay time P2 (waiting time) begins, which can be varied between 5 and 30 sec.
Default setting ex factory: 30 sec. =max; right-hand limit stop

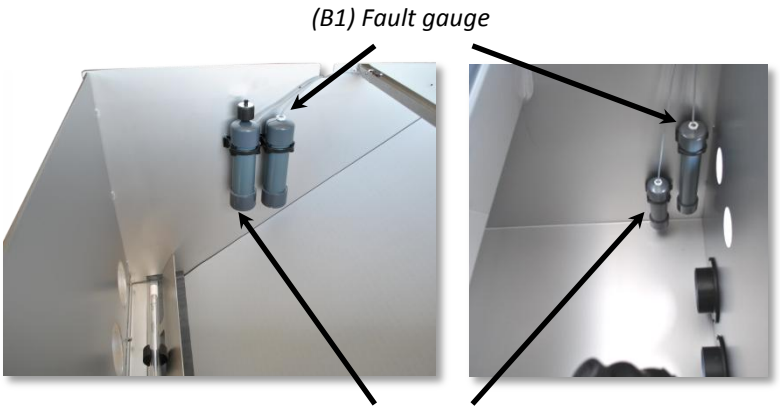
After the waiting period has passed, a new cleaning cycle can begin (if the float gauge sensor is activated).

4.2 Float gauge

The float gauge (B1) is firmly installed at the top in the filter module and its height can easily be adjusted.

For the gravity system version of the plant, the float gauge (B1) is positioned below in the bio-pond. By moving the support pipe, this can be vertically displaced. In this way, the water level in the bio-pond is defined. With a water level above the slotted overflow plate, the noise of the water can be largely reduced.

Fault gauge



G-Version S-Version

5 Optional accessories

5.1 Drying/Overflow protection

For this option, a second fault gauge is also installed (B2).

For the Pumped version, the second fault gauge (B2- recognisable at the external black floating body) is mounted at the top part of the filter chamber which switches the pump off before the filter overflows (overflow protection)!

If the water level falls below the level of the second float gauge (B2), the pump and immersion UV-C will be switched off. In this way, the pump and the biological life in the water will not dry up (dry-running protection).
The UV-C is switched on 20 seconds after restarting regular operation.

Function

These protection options provide additional protection to your pond and pump.

Pumping output

For pumping output above 40,000l/H, the option ‘‘overflow protection’’ is

>40.000 l/h	*highly recommended for all Pumped models!* *If the overflow protection system has not been installed, the manufacturer will reject any claims for damage arising through pumping out/dry of the pond.*

5.2 Integrated immersing UV-C

The Smartpond® immersing UV-C can directly integrated in the filter. For this purpose, a UV-C belt protection plate shall be built in since otherwise, the filter belt may be damaged by the UV-C rays.

Connection	The Smartpond® immersing UV-C is connected at the control unit box.
Option	The filter can optionally be equipped with a UV-C switch-off feature. Through this, the immersing UV-C will automatically switch off on removal of the protective cover.

Warning	If the additional option “UV-C disconnection’’ has not been selected and the filter is accessible to third parties, the owner of the plant shall ensure that adequate safety measures are in place on-site in order to rule out the possibility of UV-C irradiation. Never lay down the immersion UV-C on the filter belt. It shall only be placed in the UV-C holder specifically designed for it. The material can get damaged through UV-C exposure!

6 Maintenance and servicing

6.1 Cleaning of filter belt

Depending on the degree of contamination, the throughput volume on the filter belt may be reduced after some time or the rinsing water consumption may be increased since a bio-film or lime deposit forms up on the filter belt.
A narrow strip of dirt may be formed on the filter belt in the direction of movement due to blocking of a belt spraying nozzle. In this case, the nozzle has to be cleaned (see 6.5 *Cleaning of belt spraying nozzle*).

The filter belt can be sprayed and washed up with the following detergents according to the manufacturer:

Here is an overview of the resistance of the polyester filter belt fabric to various detergents (details provided by the manufacturer):

Detergent	**Concentration**	**Resistance**
Hydrochloric acid (HCl)	5 % 16 % 20 % > 35 %	good optimal limited not resistant
Citric acid ($C_6H_8O_7$)	100 %	very good
Table vinegar	**100 %**	**Very good *(our recommendation)***
Hydrogen peroxide (H_2O_2)	3 %	Very good

Instruction

The selected detergent shall be applied and allowed to have effect for at least 15 minutes. The filter belt should be as dry as possible.
The water level in the bio-pond should lie below the filter stage (filter belt).

High-pressure cleaner

The belt can cleaned with high pressure (max. 120 bar) of cold water with a distance of more than 15 cm, but without any guarantee.

Instruction

The use with a high-pressure cleaner is not guaranteed by the belt manufacturer and can be carried out at own risk. However, we have obtained some good results for it in extensive tests.

6.2 Replacement of the filter belt

The filter belt only needs to be replaced when it has been mechanically damaged or possesses a defect caused by external influences.

Instruction	Draw out the power cable so that the belt does not run unintentionally! Insert the belt such that the tag (3- if present) does not get caught in (4, see dotted arrow for direction of belt movement).

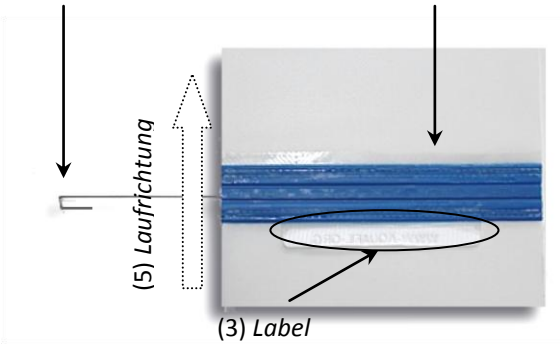
Connected belt

Position the blue quick-release lock

Carry the belt forwards till the blue quick-release lock (2) reaches the lateral opening (1). If there is no water on the belt, it can be positioned accurately at the tag with the hand (2).

(1) *Lateral opening*

(4) *Connecting wire* (2) *Blue quick-release lock*



Remove the connecting wire

Remove the connecting wire (4) of the belt from the side through the lateral opening (1) (do not draw out the belt yet).

Move in a new belt

First clean the lock thoroughly and connect the quick-release lock side of the old belt, on which the tag (2-if present) is found with the lock of the new belt (see below ‘‘connecting the belts’’). Pull out evenly at the other (open) side of the *old* belt till the end point of the new filter belt has reached the opening (1). Like this the new belt will be easily guided through. The connecting wire shall now be removed and the old belt can then be separated from the new one.

Torn belt

If the belt is no longer connected for some reason, the new belt shall then be ‘‘threaded up’’ manually.

Remove the belt

The no longer connected filter belt shall be removed so that the black conveyor belt becomes visible.

Preparation

Attach a string or the like to the right and left side of the black conveyor belt (e.g. through gluing or tying up). Control the belt feeder such that the circular part at the top becomes visible/accessible once again

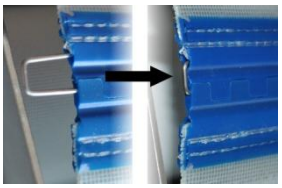
Threading up the filter

Attach the new filter belt to the threads and pull it carefully around the

belt

black conveyer belt till it comes out at the top end. The strings can be easily attached to the inserted connecting wire.

Connecting the belt



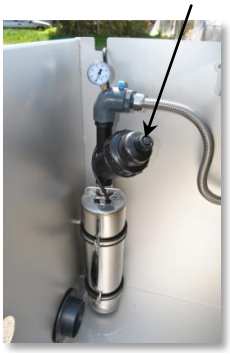
1. Position the start and end points of the belt in front of the opening (1) at the side wall of the filter.
2. Insert the connecting wire to the belt through the lateral opening in such a way that the blue teeth of the ends link together.
3. The angled piece of wire shall be inserted to the other side/loop (see picture)

6.3 Cleaning of the fine filter and pressure pump

Filter basket

The rinse water for the filter belt is obtained from the bio-pond. The pressure pump has a filter basket which can retain large wastes.

Fine filter



The *fine filter* retains all particles larger than 1/10mm. Through the double safety offered, the spraying nozzles can hardly become blocked. The fine filter (black Y-filter) has a cover cap at its end which can be unscrewed for backwashing of the fine filter. After taking off the cover manually begin the rinsing process in order to flush and clean the fine filter. Protect yourself from splashes (e.g. through connection with a hose). The complete sieve may also be removed and cleaned. The fine filter should be examined after every 3 months.

6.4 Cleaning of the float gauge

It is advisable to check the float gauge after regular intervals of time and to remove any dirt if necessary. For this purpose, the float gauge is drawn out of the pipe together with its cap, rinsed with water and put back in place again.

6.5 Cleaning of the belt spraying nozzle

Special anti-lime nozzles are used. The belt spraying nozzles are positioned below the Plexiglas lid in front of the filter belt. You can check the functioning of the flushing nozzles by slightly raising the Plexiglas lid.

Remove the spraying nozzle

Screw out the blue spraying nozzle from the PVC pipe.

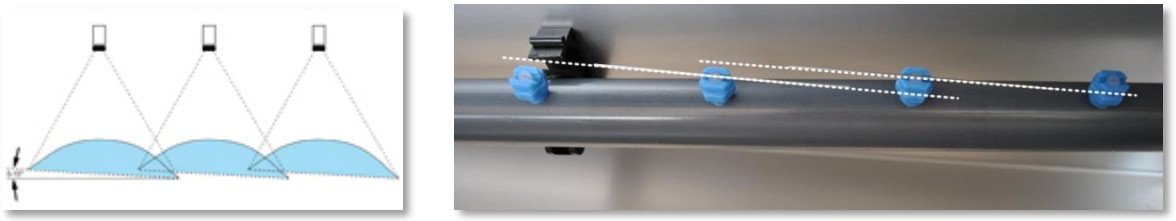
Clean the nozzle

Remove the accumulated dirt from the nozzle opening with a thin object

(e.g. thin needle).

Insert the nozzle	When the nozzle is being inserted, it shall be made sure that the thread is not overtightened.
Non-return valve	A non-return valve is present beside the manometer which prevents dripping of water from the spraying nozzle when the water level is high in the pond.
Water nozzle, Rinsing channel	Another nozzle directed inwards facilitates the efficient transport of dirt and contaminated water away from the system into the dirt outlet channel.

Instruction	The opening of the nozzle is very delicate and it shall not be damaged! The nozzles must be aligned to each other at a slightly slant angle so that the ‘‘fan beam’’ overlaps and covers a large area (see picture).



Alignment / Angle of the flushing nozzles

7 Replacement / Guarantee

Only original replacement parts of the firm AquaFil GmbH shall be used.

In case of improper installation, especially due to non-compliance with the difference in the installation height of the S-Filter to the water level of the pond, the manufacturer will not accept any claims for damage resulting from it.

For defects which arise during and after the winter season, a guarantee claim cannot be taken into consideration, if the plant has not been adequately protected against temperatures lower than zero degrees.

The following wear parts are excluded from the guarantee:

- Filter belt
- Spraying nozzles
- Fine filter insert

7.1 Further instructions

		The client is responsible for a safe installation of the G-versions on-site. *For pumping outputs above 40,000l/h, the installation of the option ‘‘Overflow protection’’ is mandatory. Without its installation, the guarantee will be considered void.* The suction area of the pressure pumps must remain free in order to avoid blockage or feeding of the pump through an air diffuser.
	**Instruction**	*EBF 1200S* The float gauge shall not be positioned deeper than at its initial position at the time of delivery. The client would be considered responsible that the pond cannot be dried out in case of a defect. AquaFil GmbH draws attention to this danger and declines any liability in the event of damage.