BIOKUBER

UltraClean For removal of solids and bacterias in drinking water



Microfiltration of bacteria and solids from Drinking water, Rivers and lakes, Ponds and wells

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DANISH ENVIRONMENTAL TECHNOLOGY ON A GLOBAL SCENE

BioKube is a Danish company dedicated to provide high quality wastewater treatment solutions that not only meet but exceed the high and complex requirements demanded by EU regulations.

Next generation water treatment

BioKube is not only offering odorless, low footprint treatment solutions, but is leading the industry to a greener more sustainable tomorrow with a deep focus on re-using treated watewater.

At BioKube we see treated wastewater as a valuable asset that can add great value.



BIOKUBE'S MISSION STATEMENT

BioKube wastewater treatment systems shall always treat wastewater better than required by the authorities with the lowest possible energy consumption. BioKube will actively take part in Circular Economy to help fulfill The United Nations Sustainable Development Goals by offering wastewater treatment systems where:

- Treated water can safely be reused
- Sludge can be converted to energy or fertilizer

BIOKUBE ULTRACLEAN REMOVES ALL PARTICLES

BioKube UltraClean system is an advanced water treatment device designed for removing all particles including bacteria and Nematodes from river water and other natural water sources. The water is treated by means of an extremely durable and efficient, third generation ultra-filtration membrane placed in an aeration chamber.





How it works

Water is pumped from the source to the UltraClean tank trough the **inlet pump**, from where it is sucked through the patented 2nd generation **ultrafilter** which consists of stacked flat sheet membranes.

The suction happens solely by means of naturally created vacuum pressure. The filter is kept free from clogging by having air bubbles constantly scrubbing the sides of the membrane.

The air is created in the **airblower** and distributed through the pipe **airdiffuser** at the bottom of the tank. The **sludge pump** returns on a tri-daily basis all sludge, particles and bacteria left in the tank created through the filtering process back to the source or a soak away pit. Read more on the process in details on page 4.

Dimensions and capacities

	UltraClean 2,5	UltraClean 5	UltraClean 15	UltraClean 30	UltraClean 55	UltraClean 110	UltraClean 165
Height (mm)	2200	2200	2200	2200	2200	2200	350
Diameter (mm)	600	600	1200	1200	2200	2200	2200x2200
Weight (kg)	100	130	250	560	550	920	1500
Capacity (m³/day) Effluent	2,5	5	15	30	55	110	165
Power consumption (Wh/day)	62	99	299	367	672	894	1166
Power consumption (Wh/m3)	25	20	20	12	12	9	7

The energy consumption is including pump to lift water into the system assuming a lifting height of 3 metre.

PROCESS DESCRIPTION IN DETAILS

1. Source Inlet Pump

The heavy-duty inlet pump transfers the water from the source to the UltraClean device. The pump is controlled from the Ultraclean's control unit. In case of source water with a high concentration of sand or clay it is recommended to make a mechanical pre-treatment of the water by means of a sand trap, before the water.

2. UltraClean tank

The water is led to the UltraClean tank, from where the treatment process will start. The tank is made of UV resistant PP material and suited for placement above ground. The system is equipped with an overflow pipe, through which also the filtrate process materials is discharged.

3. Suction by differential pressure

By taking advantage of the difference in the gravitational pressure between the water surface and the outlet at the bottom of the tank, the water is hereafter sucked trough the patented 2nd generation Flat sheet ultra-filtrations membranes. No mechanical suction pump is used for this step as the suction is created by simple natural gravitational pressure, which ensures a maintenance free, constant suction.

4. Second Generation patented Ultra Filtration Flat-sheet Membranes

The special 2nd generation ultrafiltration membranes consist of stacked multiple ultrafiltration membranes sheets made of Polyethersulfone covered by a specially designed plastic shell, that protects and keeps the membrane in place and stable. The membrane has multiple ultrafine pores with sizes of less than 0,04 µm, which only allows the treated water to pass though whereas all solids and bacteria are left inside the tank. The effluent water leaving the UltraClean device is hence free of solids and bacteria. Read more on treatment capabilities on page 6.

5. Constant air scrubbing of filters

Air is distributed from an energy efficient membrane air blower situated in the integrated control room to a tube diffuser installed at the bottom of the membrane stack. Air leaves the diffusers as small bubbles and passes along the sides of the membrane sheets, scrubbing the membranes and keeping the pores free from clogging.

6. Removal of filtrated particles and bacteria from the tank

By means of a mechanical sludge pump installed at the bottom of the UltraClean's tank, residual solids and bacteria from the filtration process left in the bottom of the tanks is pumped out of the system three times a day. The process material can be pumped back to the lake or river or to a soak away pit. The sludge pump runs automatically and is controlled by the UltraCleans's control unit.

SPECIFICATIONS OF VITAL COMPONENTS

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Airblowers

La stra	UltraClean 2,5	UltraClean 5	UltraClean 15	UltraClean 30	UltraClean 55	UltraClean 110	UltraClean 165
Mark	Thomas	Thomas	Thomas	Thomas	Thomas	Thomas	Thomas
Model	AP-80H	LP-150HN	LW-400	LW-400	2xLW-400	2xLW-400	2xLW-400
Туре	Diaphragm blower	Diaphragm blower	Diaphragm blower	Diaphragm blower	Diaphragm blower	Diaphragm blower	Diaphragm blower
Capacity [m³/h]	4,8	9	24	24	48	48	48
Running power [W]	73	130	400	400	800	800	800



Control Unit

000000	UltraClean 2,5	UltraClean 5	UltraClean 15	UltraClean 30	UltraClean 55	UltraClean 110	UltraClean 165
Mark	BioKube	BioKube	BioKube	BioKube	BioKube	BioKube	BioKube
Model	E-V	E-V	E-V	E-V	E-V	E-V	E-V
Туре	PLC	PLC	PLC	PLC	PLC	PLC	PLC
Incl.	Bluetooth	Bluetooth	Bluetooth	Bluetooth	Bluetooth	Bluetooth	Bluetooth



Inlet Pump

	UltraClean 2,5	UltraClean 5	UltraClean 15	UltraClean 30	UltraClean 55	UltraClean 110	UltraClean 165
Mark	Pedrollo	Pedrollo	Pedrollo	Pedrollo	Pedrollo	Pedrollo	Pedrollo
Model	Top Vortex	Top Vortex	Top Vortex	Top Vortex	Top Vortex	VXm 10/50N	VXm 10/50N
Туре	Vortex	Vortex	Vortex	Vortex	Vortex	Vortex	Vortex
Capacity [m³/h] @ 3m	8,4	8,4	8,4	8,4	8,4	27	27
Running power [W]	370	370	370	370	370	750	750



Sludge Pump

- Carlos	UltraClean 2,5	UltraClean 5	UltraClean 15	UltraClean 30	UltraClean 55	UltraClean 110	UltraClean 165
Mark	Pedrollo	Pedrollo	Pedrollo	Pedrollo	Pedrollo	Pedrollo	Pedrollo
Model	Top Vortex	Top Vortex	Top Vortex	Top Vortex	Top Vortex	Top Vortex	Top Vortex
Туре	Vortex	Vortex	Vortex	Vortex	Vortex	Vortex	Vortex
Capacity [m³/h] @ 3m	8,4	8,4	8,4	8,4	8,4	8,4	8,4
Running power [W]	370	370	370	370	370	370	370

HOW CLEAN IS THE TREATED WATER?

The performance of the membranes has been tested at Biological Consulting Services, Florida, USA according to NSF standards. The laboratory results for E-coli removal was tested on raw untreated sewage water containing 1.1 x 106 E-coli. Treated water contained E-coli **45 cfu / 100 ml**.

Removal rate for E-coli is **better than 99,99992 %**. In treated sewage water after a wastewater plant, the E-coli will be less than **10 / 100 ml**.

In a lake or river containing less than 10.000 E-Coli / 100 ml the outgoing E-coli after the BioKube UltraClean will be < 1 / 100 ml. The EU standard for drinking water is E-coli 0 /100 ml. The proposed standard in EU for the coming regulation for reuse of reclaimed water on edible plants like salad is that E-coli should be < 10 / 100 ml.

The standard for bathing water in lakes and rivers in EU is – for acceptable quality: < 900 E-coli / 100 ml – for good quality: < 500 E-coli / 100 ml.



Sustainability

The systems can be operated on solar power or other local power source. The energy consumption is including pump to lift water into the system assuming a lifting height of 3 metre.



CLEANING PERFORMANCE FOR DRINKING WATER

BioKube UltraClean system	Nematodes [egg/L]	E. coli Effluent concentration [cfu/100mL]	TSS outlet [mg∕l]	Nominal pore size [µm]	pH-range	Recom- mended pre- screening [mm]	Period between cleaning [months]
Membrane performance	0	< 1	< 1	< 0,04	1-12	2	3-6

Important notes

BioKube Ultra Treatment will not retain dissolved matter such as salts and chemicals.

The daily capacity is slightly dependent on amount of particles in incoming water. Very grimy water is treated at somewhat low-er capacity per hour.

Source water with very high content of sand, gravel or dissolved clay is recommended to be pre-treated in a proper pre-treatment, sand trap etc. in order to extend the life span of the filters, and protect the filter from damages.

The quality of the treated water must be regularly controlled in accordance with local authorities' guidelines.

The quality of the treated water is fully depended on performed service and maintenance as stated in the manual, including regular inspections and control of the full intactness of the filters.

Maintenance

Every 2-3 months the membrane should be cleaned by back flushing with Sodium hypochlorite (NaOCl). See manual for further instructions.

With regular proper maintenance, the treatment device, inclusive the flat sheet membranes is expected to have a lifespan of at least ten years.

For further description on service and maintenance, please see the manual.









More than 6000 units in over 50 countries

BioKube is a Danish company, which was established in 2004 and since then has supplied environmentally friendly treatment plants for wastewater both in Denmark and abroad.

Today, more than 6,000 BioKube plants are installed in 50 countries around the world. From the extreme cold areas in northern Norway to the blazing heat in the deserts in the middle East.

Our technology is covered by several international patents.



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