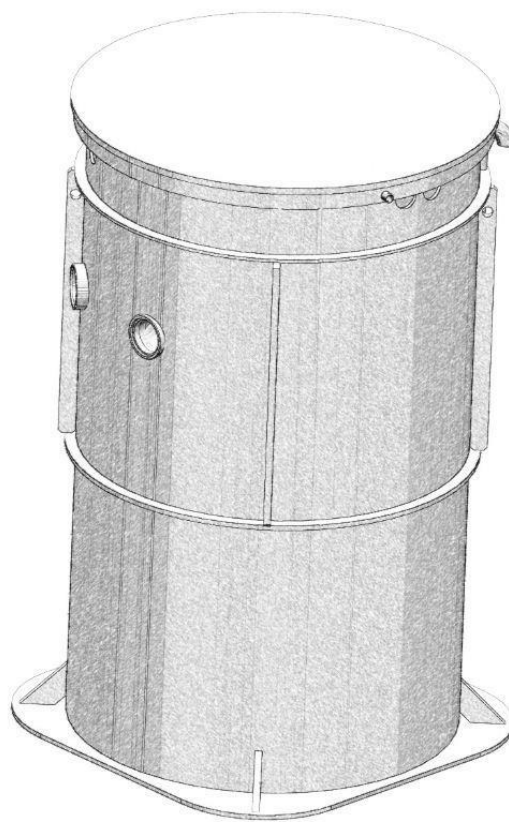




BioKube Venus 2200
Installation Manual

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1 Introduction

BioKube Venus 2200 is designed to treat ordinary household sewage water from up to 20PE*. You may not lead any other water than household sewage water to the treatment plant.

*Treatment capacity varies depending on the specific requirements, for more information contact BioKube.

1.1 Maximum Load

BioKube Venus 2200 SO and SOP are designed to treat water up to 20 PE. That means that the plant can handle a maximum 3000 litres/day. Extra load is taken into consideration, e.g. when visiting guests from time to time, as long as it meets the treatment requirement: BOD < 25 mg/l. If daily volume is above 3000 litres, larger plant must be installed.

1.2 Family Match Technology

BioKube Venus 2200 comes with FamilyMatch Technology option. With this addition, the plant's cleaning capacity and power consumption can be adjusted downwards during the period when the plant is only used with e.g. 1- 6 people. The plant can at any time be returned to a standard capacity for 20 people. BioKube's technician adjusts the plant individually at the first visit and then regularly modifies technology based on the customer's needs and plant's capabilities.



1.3 Energy Level

BioKube Venus 2200-10 PE configurations consumes 700 kWh per year. Venus 2200-10PE plant, equipped with FamilyMatch Technology, energy consumption can be reduced to approx. 300 kWh / year.

1.4 Phosphorus Removal (optional)

Where required automatic dosage of Poly Aluminium Chloride (PAC) ensures chemical precipitation of phosphorous. The yearly consumption of PAC is approximately 25 to 50 litres, and the built-in chemical tank needs refill approximately once a year.



If conditions are not described in this manual, always contact BioKube for guidance.

2 Precautions when working with wastewater

Protecting Workers from Infection

Along with "good" micro-organisms that break down sewage, wastewater contains disease-causing bacteria, viruses, fungi and parasites. When operators can't avoid contact with sewage, management should provide them with the following protective equipment and services:

- Elbow-length rubber gloves
- Rubber pants and jackets
- Googles
- Disposable mask to be worn in dusty sludge areas or areas with heavy aerosols
- Commercial high temperature washing machines for work clothing

Operator should also take the following precautions:

- Wash gloves before removing them.
- Wash hands before smoking or eating.
- Keep protective clothing and equipment out of eating areas.
- Keep work clothes and street clothes in separate lockers
- Shower and change into street clothes before going home
- Consider all cuts or abrasions to be infected. Flush them with large amounts of clean, running water and soap, and bandage them with sterile dressing.
- Workers should have a tetanus booster every 10 years and workers, who have never been vaccinated for polio, should consult a physician about getting a vaccination.
- Workers should receive the hepatitis A vaccination. Workers working in sewers that may contain fresh blood or come into regular contact with used syringes or body parts should receive the hepatitis B vaccination.

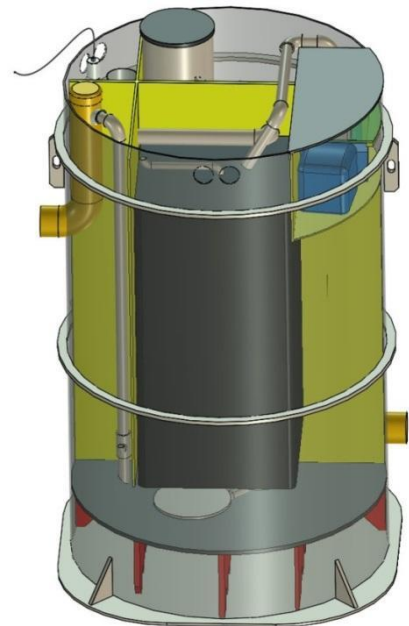
- Trucks that carry materials contaminated with sewage should be washed frequently
- Records should be kept of workers' major and minor illnesses and complaints of irritation and discomfort.

Seek medical attention when you have diarrhea or are ill. Since doctors are often unaware of the connections between occupation and disease, be sure to inform your personal physician of job exposure to sewage.

3 Receiving of Goods

Always control that the components and parts received are in accordance with your order and delivery note. Also control that the goods are without visible damages or faults.

- Please check the serial number of the Treatment Plant for any future enquiries to BioKube.
- Control that the tank has a volume according to local standard and expected sludge holding capacity.
- The gravel used for foundation and backfill should have a grain size less than 16 mm. The content of grains between 8 and 16 mm must be less than 10 %.
- All pipes must be intact and undamaged and should not be discoloured.
- Manuals and alarm are placed inside technical box during transportation.
- BioKube recommends to transport and store the Treatment Plant on pallets. No water or dirt must enter the technical box.
- The Venus system is prepared for Phosphorus removal. The Phosphorus kit is a separate product, that is only included if the plant is delivered as a Phosphorus removal system.



4 Placement of Treatment Plant

Prior to defining the final place for the Treatment Plant, the following issues should be observed:

4.1 Entrance of water

Floating of the plant with surface water must be avoided. When placing the plant

in the terrain, this must be observed in order to ensure that surface water can't enter the electrical system. The plant is dug in the ground, to ensure that 200 mm of the plant is above terrain.



Do not allow water or soil to come to the technical box.

4.2 Placement of BioKube Venus 2200

The water treatment plant must be placed at least 15 m from the water bore and in appropriate distance from property border, according to local regulations.

4.3 Placement of Settling Tank

The distance from paved road to Settling Tank should not exceed 50 metres, to enable access with sludge truck. Distance from Settling Tank to BioKube should not exceed 20 m. Alternatively we recommend installing an inspection well on the connecting pipeline.

4.4 Traffic load

BioKube Venus may not be subject to loads from heavy traffic closer than 2 metres from the plant. If this distance cannot be maintained, the contractor must install a wall in the ground to decrease the soil pressure on the plant.

4.5 Smell

A well-functioning BioKube plant does not smell. During service and maintenance unpleasant smell may occur. For this reason, the plant should be placed, so that work on the plant does not bother the daily traffic on the property.

4.6 Noise

A BioKube Venus is audible due to low noise from the continuous operation of the air compressors and the sound of water when the pump is activated. For this reason, it is recommended to avoid placement of the plant close to open windows, terraces, etc.

4.7 Alarm

The plant generates an alarm by different fall outs. The alarm unit is placed on a separate group in connection with the central electrical board of the household.

4.8 Service and maintenance

Access to and around the plant in connection with service and maintenance must be observed when placing the plant.



5 Excavation

5.1 Gravitation from Settling Tank to BioKube Venus

BioKube Venus is placed on load bearing horizontal ground with a maximum variation of ± 5 mm per 2 metres.

Excavation depth is 1,6 m. Inlet depth is 1,3 m. Outlet depth is 0,4 m and the Sludge Return depth is 0,4 m.

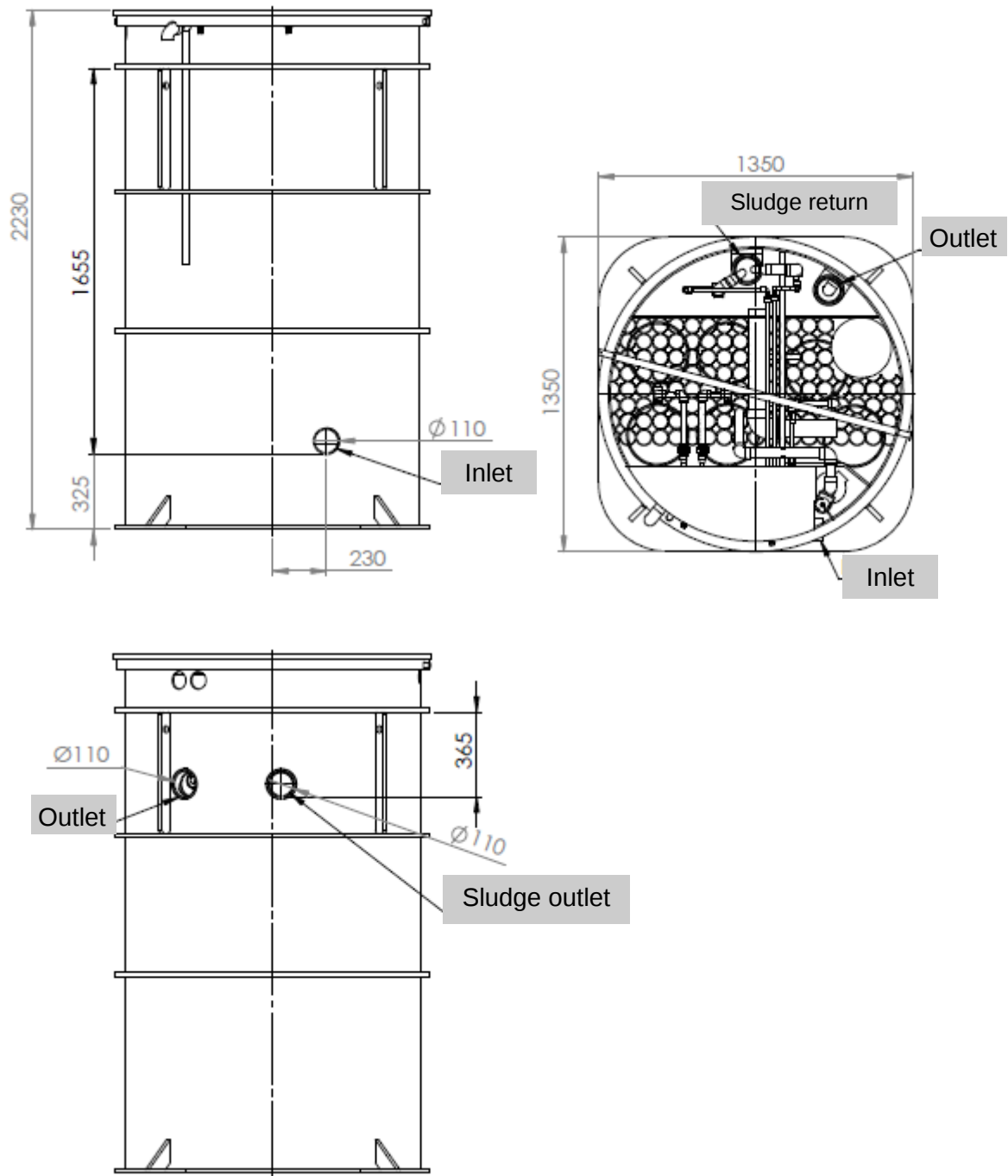
The pipeline between Settling Tank and BioKube Venus gravitates with minimum 20‰.

Preferably the sewage gravitates from Settling Tank direct to the Treatment Plant, and recirculation gravitates from the Treatment Plant to inlet of Settling Tank.

If gravitation is not possible a pump well is placed between Settling Tank and BioKube. The inlet pump in the external well must be connected the control unit of the plant. Call your BioKube distributor for guidance regarding connection and choice of inlet pump.



5.2 Physical dimensions Venus 2200



6 Installation of Venus System

6.1 Levelling layer

The plant is placed in minimum 100 mm gravel compressed to 98% standard proctor (grain size < 16 mm). By maximum excavation depth the top of the plant is 200 mm above terrain.

6.2 Pipelines

All pipelines to and from BioKube Venus are a 110 mm (external) diameter PVC sewage pipe.

6.3 Power Cable

The plan can use 2 to 5 amp. It is recommended to use a 5 x 1.5 mm² cable or 5 x 2.5 mm² cable at longer distance. The cable supplies both power to the plant and connects the alarm unit.

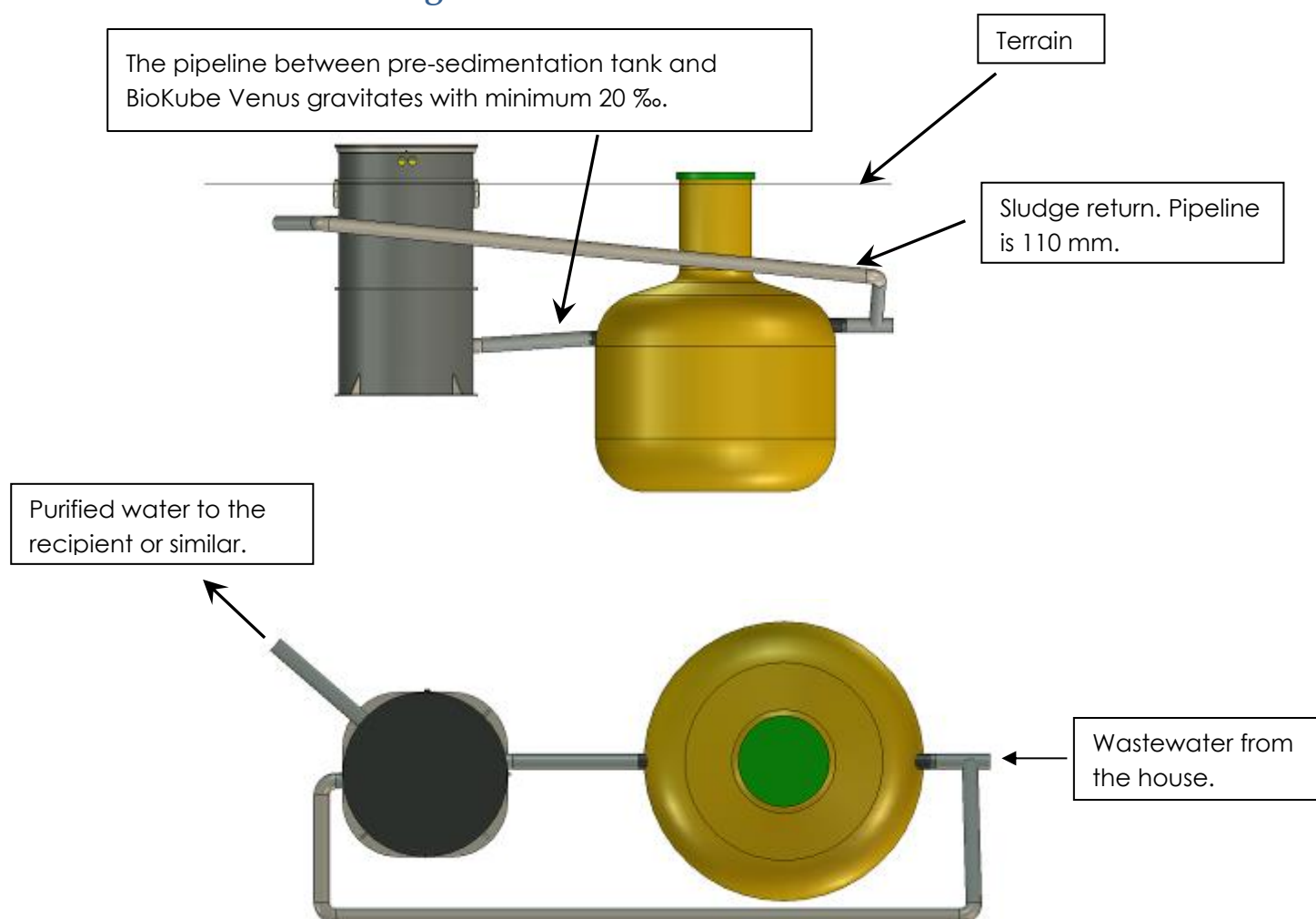
6.4 How to lift and transport

The BioKube Venus System can be lifted with a forklift. The Treatment System may only be lifted when empty.



Notice: Never lift the BioKube Venus System with water inside.

7 Connection to Settling Tank



7.1 Connection between Settling Tank and Treatment Plant

BioKube Venus is installed following a settling tank. Pipeline for gravitation of re-circulated water connects "sludge return" from the treatment plant to the inlet of the settling tank.

7.2 Frost security in cold areas

All pipelines less than 70 cm below terrain must be covered with insulation of polystyrene or similar.

7.3 Outlet

The treated water is safely led to a recipient, e.g. drainpipe, ditch, stream, etc. In case the terrain does not allow the water to gravitate to the recipient, a pump well should be installed after the treatment plant. For reuse of the treated water, BioKube recommends disinfection of the water to avoid transfer of pathogens to the environment.

8 Backfill

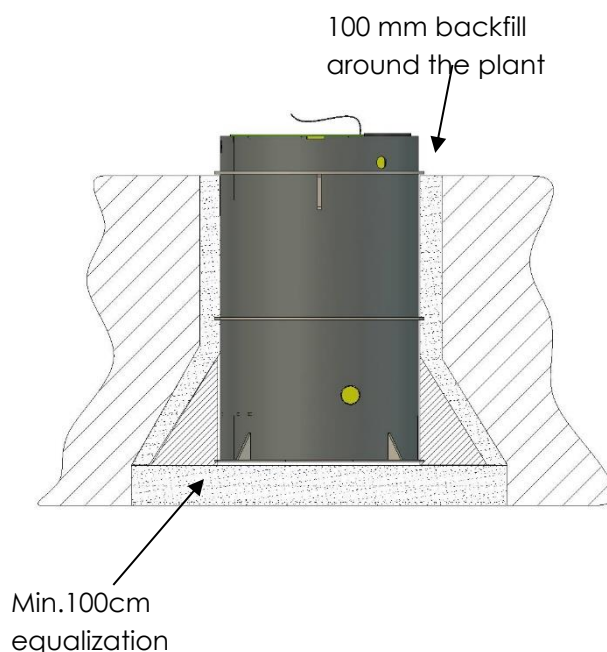
8.1 Backfill

Prior to backfilling the excavation, the plant must be filled with water, both in the built-in pump well and the Treatment System itself.

Backfill around the tanks is compressed for every layer of 200 mm to standard proctor 98 %.

Fillings around pipes and tanks is done with gravel according to specifications mentioned before. Other backfill is to be done with load bearing soil or gravel without rocks.

BioKube Venus has a strong and quite stiff tank. However, we recommend compression by means of watering the backfill without use of heavy compression material.



9 Phosphorus

9.1 Phosphorus removal (optional)

The chemical tank for phosphorus removal liquid is installed inside the Venus System.

All components for the chemical dosing are installed in the BioKube technical box from the factory.

On the control unit print board, please find the PAC dosing button. Adjust the chemical dosing according to inlet flow and phosphor concentration:

- Low inlet flow/concentration: 2, 3 or 4 sec.
- Medium inlet flow/conc.: 5, 6 or 7 sec.
- High inlet flow/conc.: 8, 9 or 10 sec.

Above dosing ranges are valid for dosing pumps with a flow of 0,4 l/h.



Chemical tank for
phosphorous removal

10 Electrical System

10.1 Power Supply

BioKube Venus 2200 is powered with 230 Volt, 1 phase power supply. The maximum current is 2-5 Ampere. The need for maximum current only occurs while starting the inlet pump. For the continuous use of blowers, the BioKube Venus ca. 120 watt.

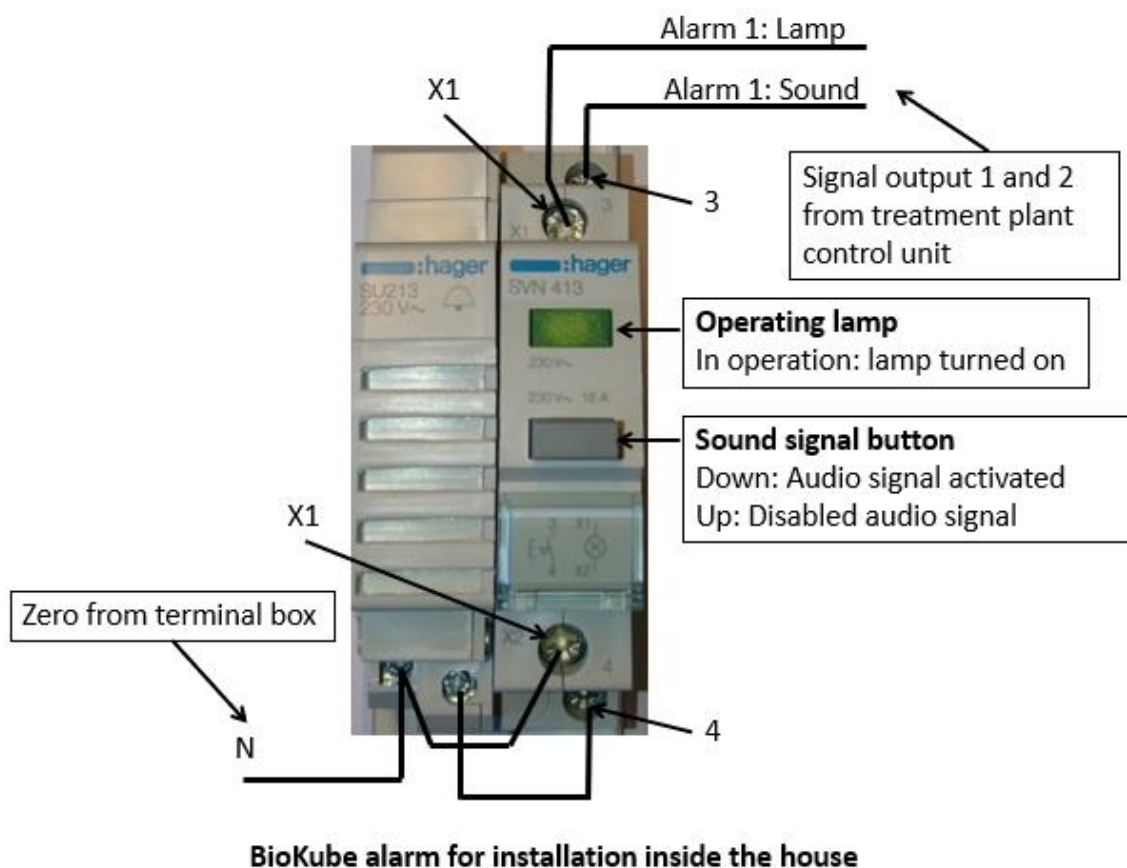
10.2 Separate Group

We recommend powering the BioKube Venus through a separate fuse, or a separate group where only light is connected. This allows for early discovery of any faults on the power supply to the plant.



10.3 Alarm Unit

The alarm unit is usually placed in the house's electrical panel, which is often located centrally in the house. See user manual for information on alarm signals and their significance.



Alarm in the house

During normal operation the lamp lights constantly. If the system fails, it will flash and there also will be a humming sound.

The sound can be muted by switch.

Alarm at the plant:

During normal operation the diode flashes. If the system fails, there will be clicking with the same frequency as the light alarm in the house. There will be no green light if the control is out of operation.

10.4 Cable

Minimum requirement for the power supply cable to the plant is a 5 x 1.5 mm² core (for 230V – 50Hz). This cable supplies both power to the plant and connects the alarm unit. The cables are placed in the steel pipe going to the technical box.

Do not drill any additional holes in the unit and do not cover the ventilation holes to the control box.

Clamp number	House installation
Ground	Ground
2	L, Phase 230 volt
4	N, nil
6	Alarm 1 (alarm unit in house)
8	Alarm 2 (alarm unit in house)



Cable inlet for technical box

Ventilation holes for technical box



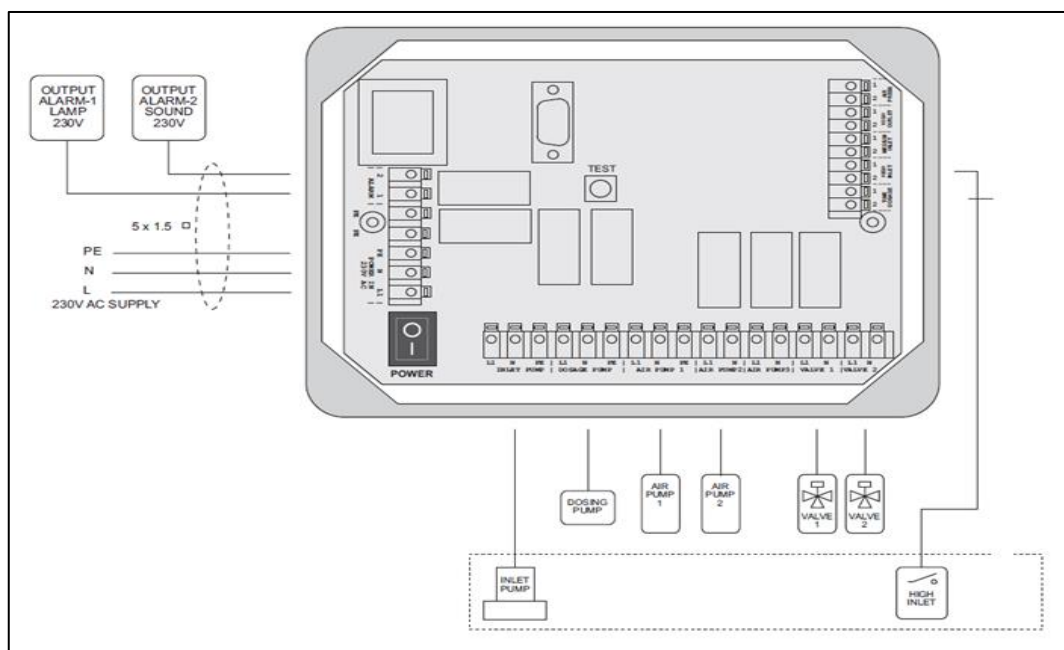
Power supply to BioKube



All electrical work must be done by a certified electrician. Maximum voltage loss in cable may not exceed 10 V.

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10.5 BioKube E-V controller.

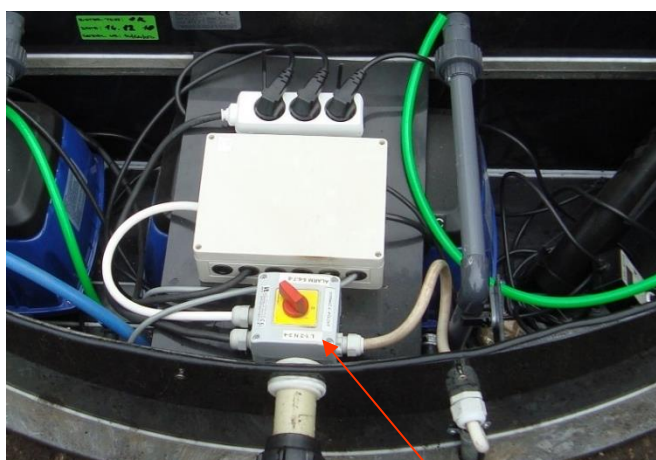


The system is controlled by a BioKube E-V control unit installed in the electrical cabinet. The control unit starts inlet pump, valves etc. at pre-set settings.

In the center of the control unit the test button is found. When holding down the test button the following test sequence will loop the components in the following steps: Inlet pump, dosing pump (where installed), valve 2, valve 1, air pump 3, buzzer/alarm. There is a 3 second pause between the steps.

When the test button is released, the plant returns to its normal functions. The test sequence will also be started whenever power to the system is switched on.

The system is switched on by turning the main switch in the technical box, picture below.



Main switch

10.6 Test function

When the unit is switched on or the test button is pressed down, following test sequence will be activated

- Inlet pump active: 3 sec.
- Pause: 3 sec.
- Dosing pump: 3 sec. (If installed)
- Pause: 3 sec.
- Sludge return clarifier 1
- Pause: 3 sec.
- Sludge return clarifier 2
- Pause: 30 sec.
- Alarm audible active: 3 sec.
- Alarm visual active: 3 sec.

11 Commissioning

The Settling Tank and BioKube are filled up with water. In addition, approximately 100 litres are led to the internal pump well.

During commissioning observe the following:

- 1: All cleaning chambers are aerated (bubbles from diffusers below BioBlock filters)
- 2: For every quarter of an hour water is pumped to first cleaning chamber for some seconds.
- 3: No alarm is generated.

11.1 Operation of plant after commissioning

Within 2-8 weeks after commissioning, the bacteria culture will build up on the submerged filters. Upon this period, the plant may not treat the sewage according to specs.

The actual length of the period depends on temperature and concentration of sewage.

As an effect of this, you may observe foam from the treatment plant the first few weeks. This is normal and not hazardous.



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