



WASTE DISPOSAL AT THE CUTTING EDGE

BioUnit - Smart disposal management of bioreactors in passenger trains

VOGELSANG – LEADING IN TECHNOLOGY

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Smart wastewater disposal from bioreactor toilets

A plus for the environment

The increasing demand for sustainable and environmentally friendly technologies has produced numerous innovations in recent years. One remarkable development is the integration of bioreactors in the disposal of train toilets. This technology not only offers an efficient way of wastewater disposal, but also contributes to the reduction of environmental pollution.

What are bioreactors?

Protec's bioreactors collect wastewater from train toilets. They work like sewage treatment plants. The treated wastewater can be discharged onto the tracks. In contrast to conventional wastewater tanks, in which the wastewater is collected, a bioreactor can go 2-6 months without being emptied. Conventional wastewater tanks have to be emptied every 2-4 days.

How do bioreactors in train toilets work?

The wastewater is clarified in the bioreactor in 3 stages. In the first stage, the solids are separated from the wastewater. In the second process, the wastewater is treated and purified in the same way as in a sewage treatment plant using microorganisms with the addition of oxygen. In the final step, the remaining liquid is thermally sterilized and discharged onto the tracks.

What does a BioUnit do?

The BioUnit is a cleaning and maintenance system. The solids or the filter cake are removed by using high pressure water, rinsing and suction. It also enables mixing, descaling and neutralization after prolonged use. Additional equipment enables fully automatic control and logging of the cleaning process.

BioUnit product family overview

BioUnit-mobil



BioUnit SMA

- Supplement to existing disposal systems, for cleaning bioreactors
- Flexible in use
- Space-saving and easy to maneuver
- Simple and easy to operate
- Semi-automatic or fully automatic cleaning operation



BioUnit MID

- Compact system including suction pump
- Flexible in use
- Space-saving and easy to maneuver
- Simple and easy to operate
- Semi-automatic or fully automatic cleaning operation



BioUnit BIG

- Compact system including suction pump
- Flexible in use
- Space-saving and easy to maneuver
- Simple and easy to operate
- Semi-automatic or fully automatic cleaning operation

BioUnit stationary



BioUnit CAB

- Stationary solution for medium to large storage and treatment facilities and workshops
- Designed as a multi-user solution
- Has central systems for wastewater treatment and the necessary supply equipment for operating materials such as cleaning chemicals



BioUnit TUnit

- Stationary solution for medium to large storage and treatment facilities and workshops
- Designed as a multi-user solution
- Automatic hose retraction
- Simple and easy to operate
- Semi-automatic or fully automatic cleaning operation



BioUnit SMA

- Supplement to existing disposal systems, for cleaning bioreactors
- Simple and easy to operate
- Semi-automatic or fully automatic cleaning operation

BioUnit SMA

Small but powerful

The advantage of the BioUnit SMA is its small size and can be connected to existing vacuum supply systems. This means that existing disposal systems for conventional wastewater tanks can also be used for the mechanical cleaning of bioreactors. It consists of a stainless steel housing and is mobile thanks to its 200 mm swivel and fixed castors.

In addition to a 200 bar high-pressure pump, it also has flow and pressure sensors, quick coupling connections and a 7" color touch panel.



Basic version Plus WDR

In the basic Plus WDR version, the BioUnit SMA is suitable for semi-automatic mechanical cleaning, i.e. suction and rinsing (also with high-pressure water) is carried out via semi-automatic cleaning programs (time & volume controlled). Due to a modular structure it can be extended to fully automatic operation and descaling. Neutralization can be carried out using an external NeutraUnit.

Basic version Pro WDR

The Pro WDR upgrade to automatic operation takes place via fully automatic cleaning programs that are run under sensor control. In addition, the 10" color touch panel displays information on the complete emptying of the tank and extended blockages at the solid and liquid tank connection.

Decalcification Chemical Upgrade WDRC

For descaling, both variants can be equipped with a WDRC chemical upgrade. This enables chemical cleaning of the solids tank and the liquid reactor. These components are filled with acid from optional external tanks. The acid circulates and is then extracted again. The systems contain an acid pump with the corresponding piping and a low-drip connection coupling. All components in contact with the media are designed to be resistant to chemicals.

A service water supply and a power supply is required at the place of use.

OPTIONS

High-pressure water nozzle

- Possible without signal cable; from the Pro version included

Signal cable to the bioreactor

- Possible without signal cable; from the Pro version included
- 4-pin, in the Plus version
 - Fill level
- 7-pin, in the Pro version
 - Level
 - Data exchange
 - Valve control

Chassis option

- Electrically powered hand pallet truck
- Further options on request

Frost protection

- Heating with frost monitor in an insulated housing

Signaling device

- Acoustic / visual operating states (operation / fault)

BioSample adapter

- Simplified automated sampling from bioreactor

Wastewater tank

- with suction lances and overflow protection

Acid tank & neutralization tank

- with suction lances and overflow protection

Remote maintenance options

Advantages

- Supplement to existing disposal systems, for cleaning bioreactors
- Flexible in use
- Space-saving and easy to maneuver
- Simple and easy to operate
- Semi-automatic or fully automatic cleaning operation

BioUnit MID

Pump power on board

The BioUnit MID is primarily intended for the mechanical cleaning of the bioreactors. It consists of a stainless steel housing and is mobile thanks to its 200 mm swivel and fixed castors. In addition to a 200 bar high-pressure pump, it also has flow and pressure sensors, quick coupling connections and a 7" color touch panel. It also has its own rotary lobe pump without frequency converter to generate an own vacuum wastewater disposal.



Basic version Plus WDR

In the basic Plus WDR version, the BioUnit MID is suitable for semi-automatic mechanical cleaning, i.e. suction and rinsing (also with high-pressure water) is carried out via semi-automatic cleaning programs (time & volume controlled). Due to a modular structure it can be extended to fully automatic operation and descaling. Neutralization can be carried out using an external NeutraUnit.

Basic version Pro WDR

The Pro WDR upgrade to automatic operation takes place via fully automatic cleaning programs that run under sensor control. In addition, the 10" color touch panel provides information on the complete emptying of the tank and extended blockages at the solid and liquid tank connections.

Decalcification Chemical Upgrade WDRC

For descaling, both variants can be equipped with a WDRC chemical upgrade. This enables chemical cleaning of the solids tank and the liquid reactor. These components are filled with acid from optional external tanks. The acid circulates and is then extracted again. The BioUnit MID contains a stainless steel rotary lobe pump with frequency converter and extended piping and a low-drip connection coupling. All wetted components in contact with the media are designed to be resistant to chemicals. A service water supply and a power supply is required at the place of use.

OPTIONS

High-pressure water nozzle

- Possible without signal cable; from the Pro version included

Signal cable to the bioreactor

- Possible without signal cable; from the Pro version included
- 4-pin, in the Plus version
 - Fill level
- 7-pin, in the Pro version
 - Level
 - Data exchange
 - Valve control

Chassis option

- Electrically powered hand pallet truck
- Further options on request

Frost protection

- Heating with frost monitor in an insulated housing

Signaling device

- Acoustic / visual operating states (operation / fault)

BioSample adapter

- Simplified automated sampling from bioreactor

Wastewater tank

- with suction lances and overflow protection

Acid tank & neutralization tank

- with suction lances and overflow protection

Remote maintenance options

Advantages

- Compact system including suction pump
- Flexible in use
- Space-saving and easy to maneuver
- Simple and easy to operate
- Semi-automatic or fully automatic cleaning mode

BioUnit BIG

All in one unit

The BioUnit BIG is designed for both mechanical and chemical cleaning of the bioreactors. The built-in tanks make it a compact system for all cleaning and maintenance tasks. In addition to a 200 bar high-pressure pump it has flow and pressure sensors, quick coupling connections and a 10" color touch panel. The in-house rotary lobe pump with frequency converter for generating its own vacuum wastewater disposal and a 2,000 l wastewater tank made of GRP for the intermediate storage of the wastewater complement the unit.



Basic version Plus WDR

In the basic Plus WDR version, the BioUnit BIG is suitable for semi-automatic mechanical cleaning, i.e. suction and rinsing (also with high-pressure water) is carried out via semi-automatic cleaning programs (time & volume controlled). Due to a modular structure it can be extended to fully automatic operation and descaling. A neutralization can be carried out using an external NeutraUnit.

Basic version Pro WDR

The Pro WDR upgrade to automatic operation takes place via fully automatic cleaning programs that run under sensor control. In addition, the color touch panel provides information on the complete emptying of the tank and extended blockages at the solid and liquid tank connection.

Descaling chemical upgrade WDRC

For descaling, both variants can be equipped with a chemical upgrade WDRC for descaling. This enables chemical cleaning of the solids tank and the liquid reactor. The built-in GRP tank is divided into two parts, to store the 3% acid mixture and reuse it several times. During decalcification the acid is circulated in the bioreactor and sucked back into the acid tank. The systems contain a stainless steel rotary lobe pump with frequency converter and extended piping. All components in contact with the media are designed to be resistant to chemicals. The BioUnit BIG offers the option of testing the quality of the cleaning with a so-called P-tester and to document the result of the cleaning process.

In addition, the BioUnit BIG also offers the option of automatically neutralize the acidic wastewater, so that it can be discharged directly into the sewer system. A process water supply and a power supply at the place of use is required.

OPTIONS

High-pressure water nozzle

- Possible without signal cable; from the Pro version included

Signal cable to the bioreactor

- Possible without signal cable; from the Pro version included
- 4-pin, in the Plus version
 - Fill level
- 7-pin, in the Pro version
 - Level
 - Data exchange
 - Valve control

Chassis option

- Without chassis, e.g. for installation on electric platform truck, trailer
- With electric platform truck (hand-guided or self-propelled)
- Chassis for towing operation e.g. for electric tractors or forklift truck
- Further options on request

Frost protection

- Heating with frost monitor in an insulated housing

P - Tester

- For automated blow-through test
- including compressor

Tank capacity

- 2,350 l

Signaling device

- Acoustic/optical operating states (operation / fault)

BioSample adapter

- Simplified automated sampling from bioreactor

Cable reel

- For power cable

Hose reel

- For water supply hose

Remote maintenance options

Advantages

- Compact system including suction pump
- Flexible in use
- Space-saving and easy to maneuver
- Simple and easy to operate
- Semi-automatic or fully automatic cleaning mode

The stationary solution

Disposal system for bioreactor toilets

The stationary solutions are designed for medium to large storage and treatment facilities and workshops. They are equipped with centralized systems for wastewater treatment as well as the necessary supply facilities for operating materials such as cleaning chemicals.



Depot in UK:
2 x BioUnit BIG S T2600



Depot in UK:
2 x TUnit MP Bio
Machine room with 2 x VacUnit DP VX136-140Q,
NeutraUnit, (AT and CNT tank)

Technical data

Interfaces	BioUnit SMA	BioUnit MID	BioUnit BIG
Interfaces to bioreactor	3 m 2" hose with 3" - Kamlock female part - coupling	3 m 2" hose with 3" - Kamlock female part - coupling	5.5 m 2" hose with 3" - Kamlock female part - coupling
	3 m 1.5" hose with 1" - Kamlock female part - coupling	3 m 1.5" hose with 1" - Kamlock female part - coupling	5.5 m 1.5" hose with 1" - Kamlock female part - coupling
	5 m DN 8 high-pressure water hose with M21*1.5 mm coupling	5 m DN 8 high-pressure water hose with M21*1.5 mm coupling	10 m DN 8 high-pressure water hose with M21*1.5 mm coupling
	7 m signal cable, coupling according to option	7 m signal cable, coupling according to option	10 m signal cable, coupling according to option
Supply interfaces	CEE plug 32A - 6h 3P + N + PE, 7 kW, 3 ~ 400 V, 50 Hz	CEE plug 32A - 6h 3P + N + PE, 11 kW, 3 ~ 400 V, 50 Hz	20 m 5*6 mm ² with CEE plug 32A - 6h 3P + N + PE, 13 kW, 3 ~ 400 V, 50 Hz
	Service water connection with 1" Kamlock male connector 3 bar, 60 l / min	Service water connection with 1" Kamlock male connector 3 bar, 60 l / min	20 m supply hose ¾" with Geka coupling KA40, 3 bar, 60 l / min
	Wastewater disposal via Vacuum connection 2" - Kamlock Male part - plug External, constant vacuum -0.5 bar, 5m ³ / h required	Wastewater disposal via pressure connection 2" Kamlock male part Connector external tank or sewer required	For wastewater disposal Access to sewer required
	Adapter hose from 2" - Kamlock female part - coupling to 3" - Kamlock male part - plug	Adapter hose from 2" - Kamlock female part - coupling to 3" - Kamlock male part - plug	
Electrical power requirement / pre-fuse	7 kW	11 kW	13 kW
Dimensions L x W x H approx.	1,400 mm x 680 mm x 1,500 mm	1,500 mm x 800 mm x 1,500 mm	3,360 mm x 1,450 mm x 2,300 mm
Weight approx.	250 kg	350 kg	2,000 kg
Ambient temperatures	-20 to +40 °C	-20 to +40 °C	-20 to +40 °C
Ambient conditions	Moderate according to C3 (according to DIN EN ISO 12944)	Moderate according to C3 (according to DIN EN ISO 12944)	Moderate according to C3 (according to DIN EN ISO 12944)

What we offer

We provide solutions in the following sectors:
AGRICULTURAL TECHNOLOGY, BIOGAS,
INDUSTRY, TRANSPORTATION, WASTEWATER



Our broad range of products and services

- Consulting and service
- Data management and control technology
- Disintegration technology
- Individually tailored solutions for special applications
- Pumps and pump systems
- Solid matter feeders
- Solids reduction, separators and mixers
- Spreading technology
- Supply, disposal and cleaning

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