

PRODUCTLINE
FLEXBIO-AF
FLEXBIO-AFBB
FLEXBIO-AFBBM

PRODUCT PROGRAM

**FLEXBIO-COMPACT WASTE WATER
TREATMENT PLANTS**

OUR SERVICES



Waste water treatment
The unique FlexBio wastewater treatment plants work energy-efficiently and cost-effectively in all areas of application. Whether you want to clean weakly polluted wastewater on a farm or heavily polluted wastewater from industry, the FlexBio portfolio always offers a suitable solution.



Biogas technology
The FlexBio biogas process developed by us is suitable both for use in agriculture and in waste management. Our fixed bed technology convinces with very high flexibility - e.g. suitable for on-demand biogas production without large gas storage - as well as with high process stability and efficiency.



Water treatment
FlexBio Technologie GmbH offers compact and modular water treatment plants as container solutions. The container plants for water treatment are delivered turnkey and ready for use.



Pilot plants
As a plant manufacturer, we offer a wide range of test facilities. In addition to our standardized test facilities, we also provide individual customer solutions. Having your own prototype gives you great flexibility in the development and optimization of your processes.



Control and measuring technology
As a manufacturer of waste water treatment plants, water treatment plants, biogas plants and experimental plants of all sizes, we are very familiar with the production of control systems including development, planning, design and programming.



Service
FlexBio Technologie GmbH is your contact for the first consultation on the planning, construction and commissioning of the unique FlexBio technology systems.

TABLE OF CONTENTS

WASTE WATER TECHNOLOGY 4

AREAS OF APPLICATION 5

FLEXIBLE SOLUTIONS 6

PROCESS RELIABILITY 7

SERVICE 8

POTENTIAL EVALUATION 9

CLEANING PARAMETERS 9

PRODUCT LINE FLEXBIO-AF 10

PRODUCT LINE FLEXBIO-AFBB 12

PRODUCT LINE FLEXBIO-AF-BBM 14

EXTERNAL OPERATOR OR IN-HOUSE OPERATION? 16

FLEXIBLE FINANCING 17

TECHNICAL SPEZIFICATIONS 18



WASTE WATER TECHNOLOGY

FlexBio technology stands for innovation, competence and flexibility in the development and implementation of resource-saving and sustainable solutions for the benefit of our customers. We combine effective consulting with high-quality engineering services in all areas of wastewater treatment, biogas technology and fresh water treatment.

We offer a complete realization of projects. From the first drawing to the key handover of the finished system.

Applications:

- Degradation of organic substances (BOD, COD)
- Nitrification
- Nitrification
- Deammonification

The unique FlexBio wastewater treatment plants work energy-efficiently and cost-effectively in all areas of application. Whether you want to clean slightly polluted wastewater on a farm or heavily polluted industrial wastewater, the FlexBio portfolio offers the

right solution. The technology is easy to operate and impresses with its reliable cleaning performance.

You will also benefit from the specially developed and patented process, as the organic pollutants are converted into biogas, which is directly available to you as a sustainable and environmentally friendly source of energy and permanently improves your carbon footprint.

The FlexBio technology can either be delivered in compact modular containers according to the plug & play principle or built as a large-scale system at your site. We can offer full range of service from planning, construction and installation to commissioning of your wastewater treatment plant. Even system operation according to individual operating schemes is possible. Based on our extensive experience and proven-and-tested lab procedures, we can offer an optimal, custom-tailored process for your waste water treatment.

AREAS OF APPLICATION

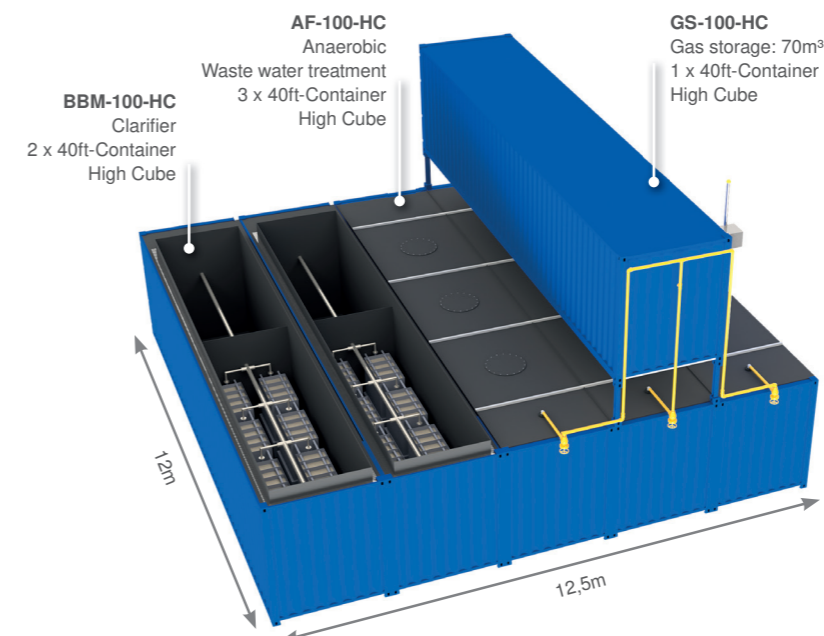
Wastewater treatment plants in a compact and modular design for municipal, industrial, commercial and agricultural organically polluted wastewater in the range of 50 to 52,000 PE for:

- Beverage producers (juice producers, breweries, distilleries)
- Food production
- Industrial waste water / process water
- Paper mills
- Chemical industry
- Decentralized isolated solutions for domestic waste water and hotel facilities
- Polluted surface water on farms and biogas plants

YOUR ADVANTAGES

- Fast and highly efficient reduction of organic load (COD and BOD5)
- Effective reduction of nitrogen load
- Production of biogas
- High process stability
- Compact and modular design (expandable if required)
- Systems are delivered completely pre-assembled
- Fast connection and commissioning
- Low operating costs
- Reduced time and effort through automated processes
- Leasing or hire purchase possible!

WASTEWATER TREATMENT FOR DIRECT OR INDIRECT DISCHARGE, AS NEW CONSTRUCTION, EXPANSION OR MODERNIZATION.



3D MODEL OF A TYPICAL FLEXBIO PLANT:

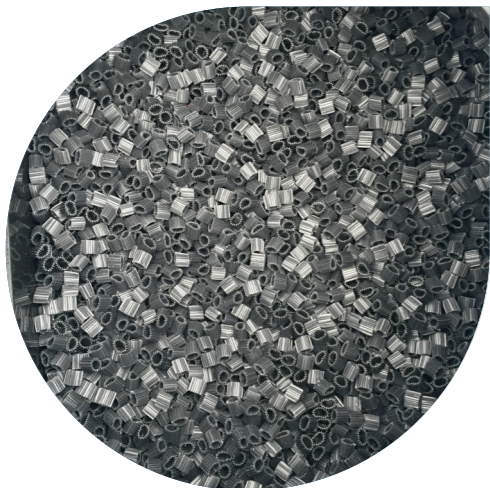
Application: Beverage producer

Waste water amount: 110.000 m³/a
COD-load: 3.500 mg/l

Effluent:
Values: < 50 mg/l
COD: < 10 mg/l
Nitrogen: < 1 mg/l

Biogas :
Gas production: 115.000 m³ CH₄/a

FLEXIBLE SOLUTIONS



FlexBio Technologie GmbH manufactures and markets a specially developed process for anaerobic wastewater treatment in a compact and modular design. In combination with membrane ultrafiltration, our compact systems achieve the highest effluent qualities.

Anaerobic fixed bed fermenters are offered in transportable container construction and can be supplemented by an activated sludge stage. Depending on the amount of waste water to be treated, the modules can be set up and operated in parallel.

Various sizes of fixed bed, activated sludge and ultra-filtration membrane modules are available in standardized ISO containers. For example, with an anaerobic fixed-bed plant in a 20-foot container, up to 45 m³ of wastewater or up to 350 kg of COD can be treated daily.

The FLEXBIO-AF-BBM product line provides environmentally friendly, cost-effective and flexible wastewater treatment solutions for municipal and private companies.

The essential feature of the FLEXBIO process is an effective wastewater treatment with the production of biogas. On the one hand, the biogas can be used for energy purposes and on the other hand the mass of the resulting sludge can be reduced by approx. 90% compared to conventional wastewater treatment.

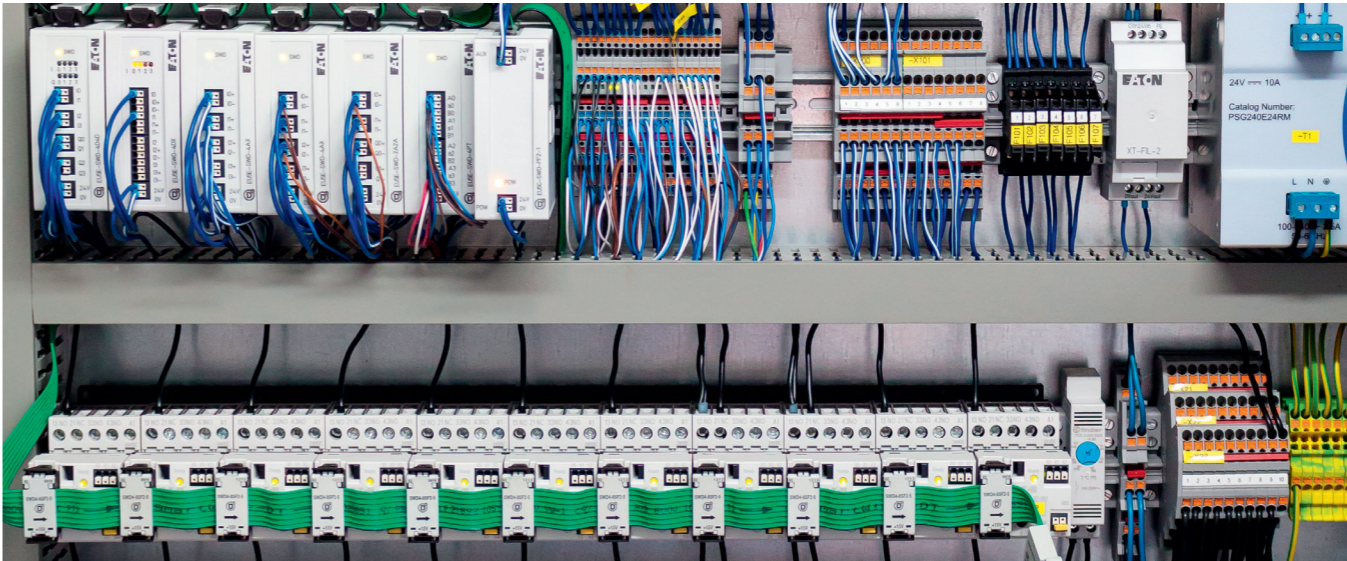
The patented procedure allows effective reduction of ammonium, nitrite and nitrate. The generation and use of biogas from wastewater leads to avoidance of greenhouse gas emissions and environmental impacts.



PROCESS RELIABILITY

The modules of the FLEXBIO-AF-BBM product line are equipped with control and measuring technology and are designed for autonomous and fully automatic operation. Continuous measurements of relevant parameters as well as an intelligent PLC control ensure optimal operation of the plant and safe compliance with the environmental standards. All settings and functions can be controlled locally or remotely by a PC, e.g. via connection with GSM modem or via LAN (Internet). Messages and measured values can be sent by SMS, e-mail and fax.

Process monitoring / control
Fully automatic process control
Input Flow measurement / flow control
Temperature control
Flow Switch
Monitoring of fill levels
Optical status indication / error message
Logbook function
Connection to the control room (optional)
Online monitoring
Data acquisition
Continuous measurement and recording of parameters
Temperature, pH, redox potential
Conductivity, turbidity
SAK, COD, BOD, NO ₃ ⁻ , NO ₂ ⁻ , NH ₄ ⁺ , AFS



Feeding of the system is controlled according to the level in the reservoir. In addition, the organic load of the wastewater is measured and the feed is throttled if necessary. The FLEXBIO-AF-BBM systems can buffer very high load fluctuations and continue to provide excellent cleaning performance. As far as possible, feed monitoring ensures as far as possible an even load in the system. Thus, the strictest limit values can be kept.

With the aid of a spectral sensor for online measurement of SAK (spectral absorption coefficient), an internally specified limit value is monitored. The SAK sum parameter is an indicator for the organic load of the purified water. This way the cleaning performance is monitored and adjusted if necessary.

SERVICE



FlexBio Technologie GmbH provides a comprehensive service in the field of wastewater technology. Our service is tailored to individual customer needs and ranges from general consulting to complete system operation, so that you can focus on your main business.

- Inventory
- Support in the development of a drainage concept
- Profitability calculations
- Professional system designs and planning of your construction project
- Clarification calculations and drawings
- Support in the preparation of approval documents
- On-site installation
- System handover only after a stable operation has been achieved and limit values are safely kept
- Remote monitoring
- Maintenance and emergency service
- Laboratory analyses



POTENTIAL EVALUATION

In many cases, configuration of the wastewater technology for future treatment plants can be carried out in advance by means of standardized preliminary investigations. Thus, you will save on the investment side as well as in the subsequent operation. Furthermore, it enables you to assure yourself of our service before placing an order. Preliminary examinations can be carried out both in the laboratory, in technical center and directly on-site in the operating environment of your company.

CLEANING PARAMETERS

- Reduction of organic pollution (COD/BOD₅ degradation)
- Elimination of nitrogen compounds (Nitrogen, NH₄⁺-N, NO₃⁻-N, NO₂⁻-N)
- Phosphorus removal



PRODUCT LINE FLEXBIO-AF

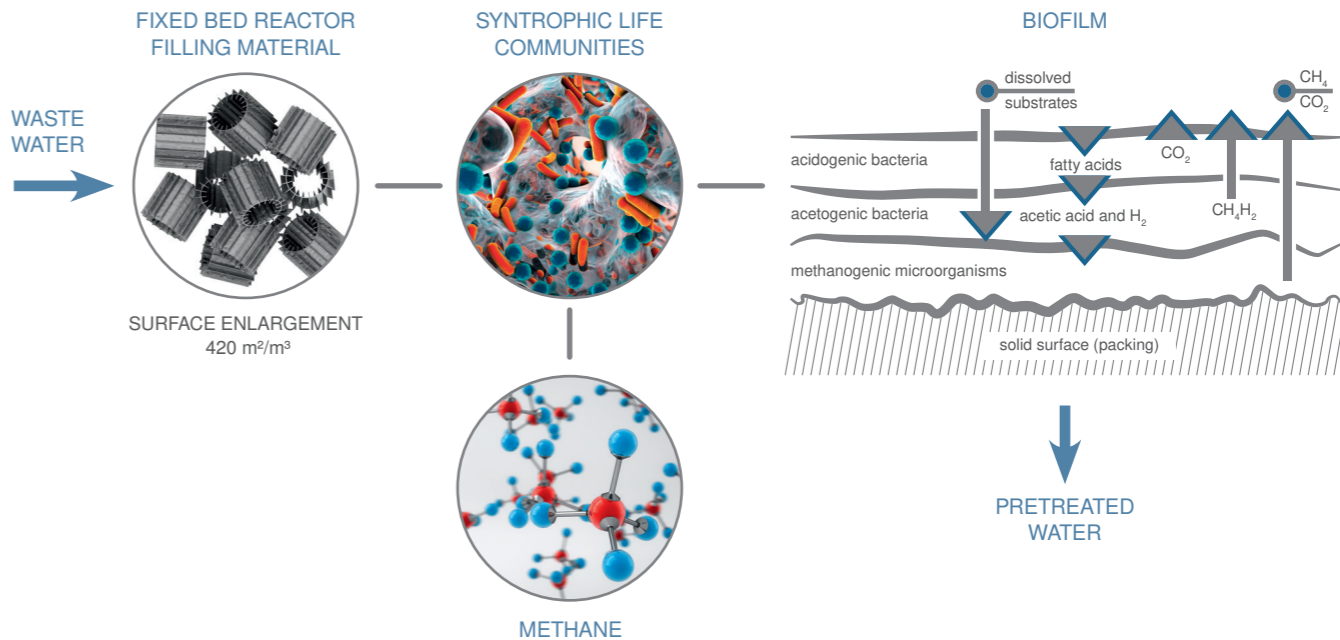
ANAEROBIC FIXED BED



Our container-based plant type FLEXBIO-AF purifies wastewater with the aid of bacterial fermentation processes. This produces valuable biogas that can be used as an energy source for heating or power generation. Wastewater treatment becomes a power plant and wastewater a fuel!

The underlying principle is simple and equally efficient. The anaerobic wastewater treatment plant in a compact and modular design can be transported easily and quickly. The design allows a space-saving installation according to the plug & play principle, connecting the container systems is at the mist waste water producing facilities possible.

The design and technical configuration are adapted to the specific needs of our customers. For the removal of solid particles, fibers and sand, a primary clarification by means of preliminary fine separation is necessary.

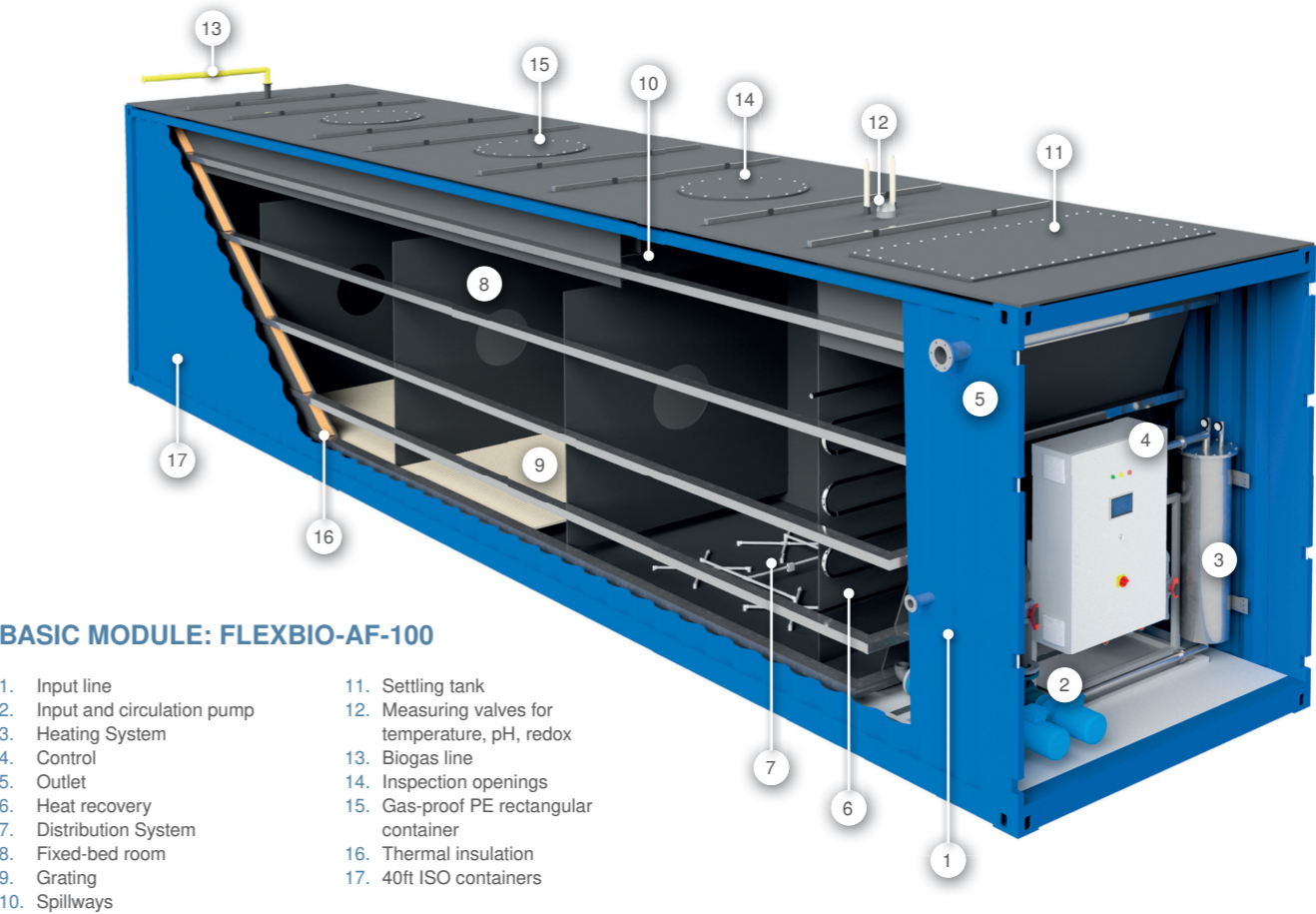


WE ARE THE ONLY SUPPLIER OF

ANAEROBIC WASTE WATER TREATMENT PLANTS

IN COMPACT CONTAINER SOLUTIONS!

Type	Description	Basic module	Expansion module
AF-050	<ul style="list-style-type: none">• ISO 20ft container, pretreatment, expandable• Application: commercial, industrial wastewater with organically degradable substances• Biogas production• Medium to heaviypolluted wastewater; 2900 PE• Engine room; Anaerobic stage / fixed bed; sludge		
AF-100	<ul style="list-style-type: none">• ISO 40ft container, pretreatment, expandable• Application: commercial, industrial wastewater with organically degradable substances• Biogas production• Medium to heavily polluted wastewater; 5800 PE expandable up to 8 expansion modules; up to 52000 PE• Engine room; anaerobic stage / fixed bed; sludge		



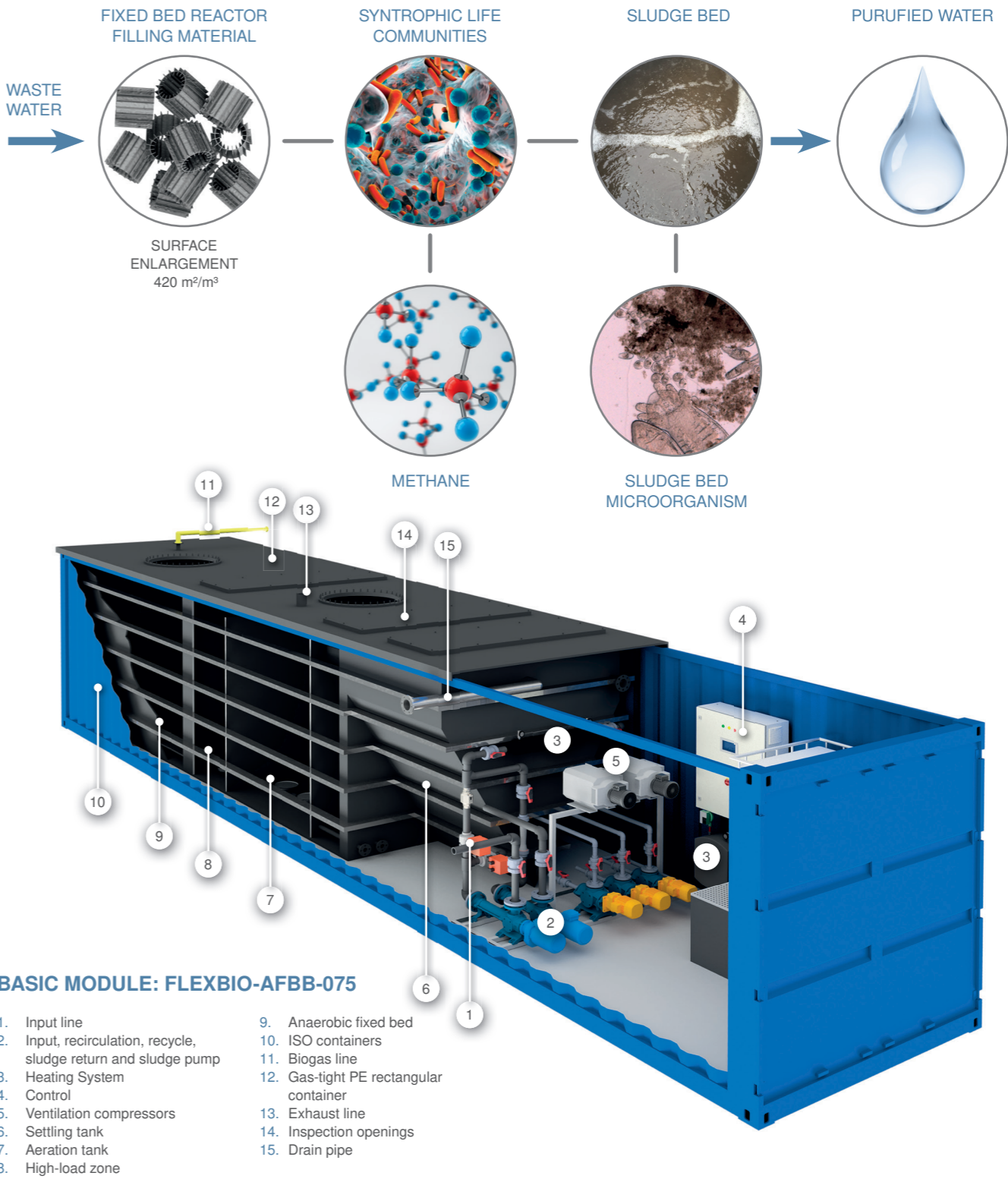
PRODUCT LINE FLEXBIO-AFBB

ANAEROBIC FIXED BED AND ACTIVATED SLUDGE REACTOR

The product line FLEXBIO-AFBB enables effective reduction of organic pollution and nitrogen compounds in wastewater. The compact wastewater treatment plant is modularly expandable due to its container construction. After treatment, the water can be fed back into the natural cycle without affecting the water quality. The process is characterized by low sewage sludge accumulation and low energy costs.

The produced biogas can be used to generate energy. The design and technical configuration are adapted to the specific needs of our customers. The compact sewage treatment plants of the FLEXBIO-AFBB series are completely pre-assembled. To remove solid particles, fibers and sand, a primary treatment can be integrated into the process.

Type	Description	Basic module	Expansion module
AFBB-050	<ul style="list-style-type: none">• ISO 20ft container, fully biological clarification• Use: Industry, Municipalities and Agriculture; Effective reduction of organic load (COD, BOD₅) and nitrogen load• Biogas production• Medium to heavily polluted wastewater; 1250 PE• Expandable• Engine room; Anaerobic stage / fixed bed (pretreatment); Aerobic stage (activated sludge); clarifier		
AFBB-075	<ul style="list-style-type: none">• ISO 40ft container, fully biological clarification• Use: Industry, Municipalities and Agriculture; Effective reduction of organic load (COD, BOD₅) and Nitrogen load• Biogas production• Medium to heavily polluted wastewater; 2100 PE• Expandable• Engine room; Anaerobic stage / fixed bed (pretreatment); Aerobic stage (activated sludge); clarifier		
AFBB-100	<ul style="list-style-type: none">• ISO 40ft container, fully biological clarification• Use: Industry, Municipalities and Agriculture; Effective reduction of organic load (COD, BOD₅) and nitrogen load• Biogas production• Medium to heavy polluted wastewater; 5800 PE• Engine room; Anaerobic stage / fixed bed (pretreatment); Aerobic stage (activated sludge); clarifier		
AFBB-KOMBI	<ul style="list-style-type: none">• Combination of the system modules in ISO-40ft/20ft containers AF-100-BB-100-E/AF-050-BB-050-E• Use: Industry, Municipalities and Agriculture; Effective reduction of organic load (COD, BOD₅) and nitrogen load• Biogas production• Medium to heavily polluted wastewater; 5800 PE• Expandable to up to 8 expansion modules; up to 26,000 inhabitants• Engine room; Anaerobic stage / fixed bed (pretreatment); Aerobic stage (activated sludge); clarifier		



PRODUCT LINE FLEXBIO-AF-BBM

ANAEROBIC FIXED BED AND MEBRANE BIOREACTOR

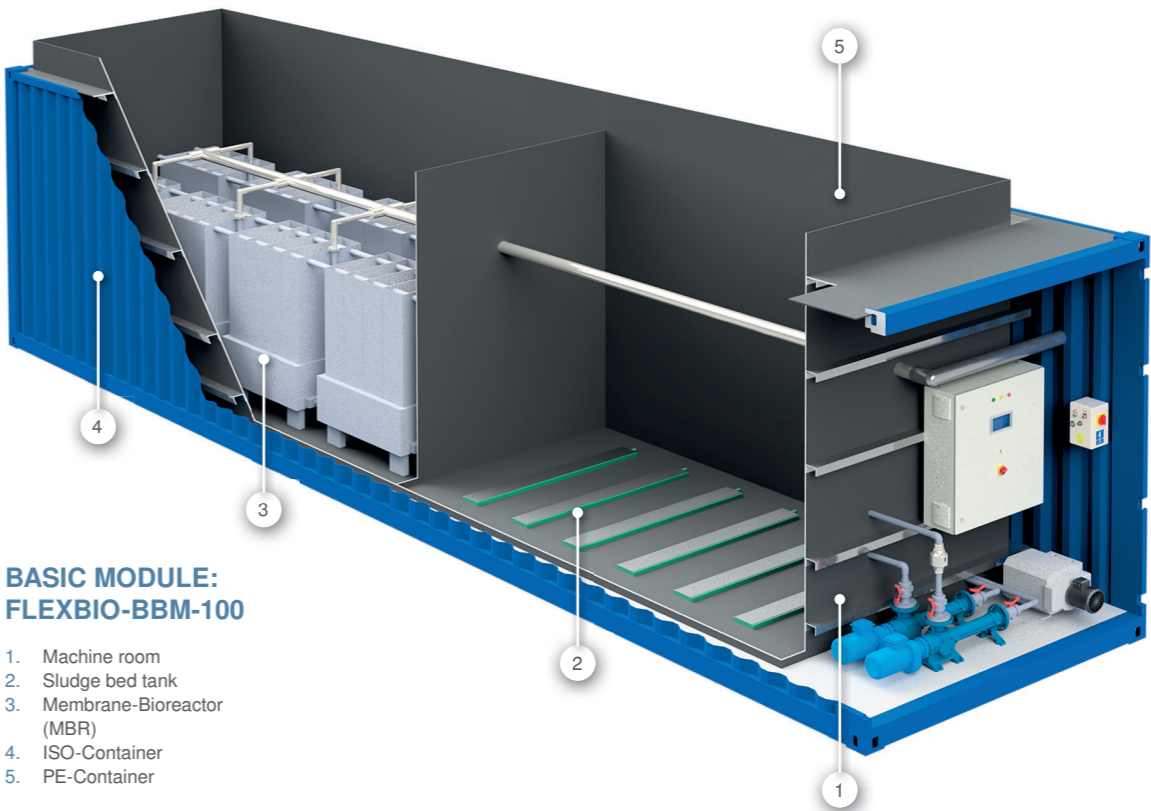
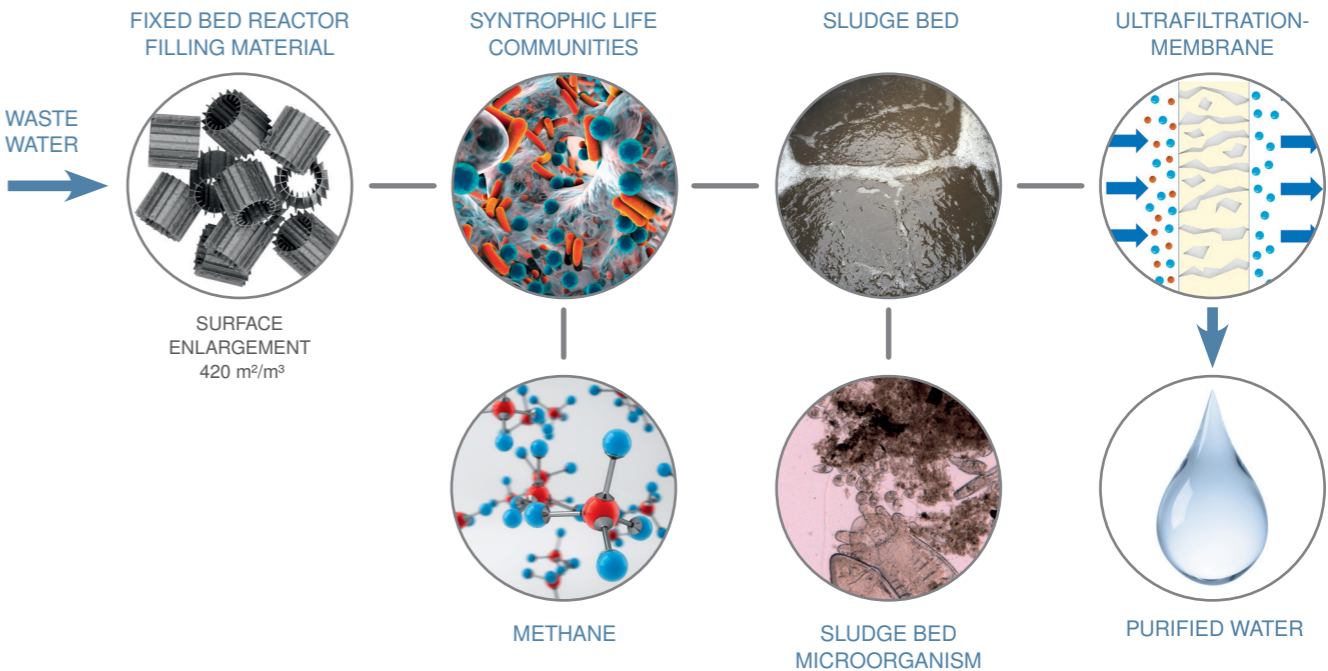
The FLEXBIO-AFBBM product line combines a modern ultrafiltration membrane with our proven-and-tested anaerobic FlexBio process. Membrane ultrafiltration, used as a membrane activated sludge reactor (MBR), enables effective sludge and particulate retention. Even bacteria and dissolved particles in the nano range are retained by the membrane, so that the purified water is also hygienic. An effective sludge retention additionally achieves excellent cleaning performance. Our compact systems can be extended modularly by additional containers. After treatment, the water can be fed back into the natural cycle without affecting the water quality. The biogas produced in the anaerobic stage can be used for energy generation

A UNIQUE COMBINATION:

ANAEROBIC PRETREATMENT AND

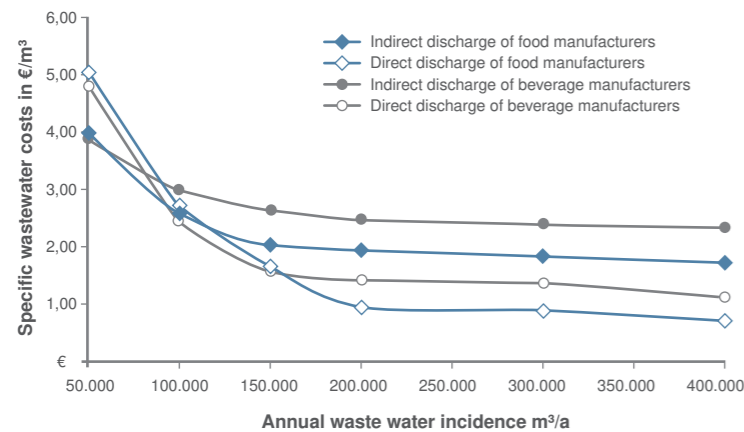
MEMBRANE ACTIVATED SLUDGE REACTOR

Type	Description	Basic module	Expansion module
BBM-050	<ul style="list-style-type: none">• ISO 20ft container, fully biological clarification• Use: Industry, Municipalities and Agriculture; Effective reduction of organic load (COD, BOD₅), Nitrogen load and AFS; sanitization• Biogas production• Medium to heavily polluted wastewater; 3800 PE• Expandable• Engine room, anaerobic stage/fixed bed (pretreatment), membrane activated sludge stage/ultrafiltration		
BBM-100	<ul style="list-style-type: none">• ISO 40ft container, fully biological clarification• Use: Industry, Municipalities and Agriculture; Effective reduction of organic load (COD, BOD₅), Nitrogen load and AFS; sanitization• Biogas production• Medium to heavily polluted wastewater; 1900 PE• Expandable up to 8 expansion modules; up to 17000 inhabitants• Engine room, anaerobic stage/fixed bed (pretreatment), membrane activated sludge stage/ultrafiltration		
AFBBM-100	<ul style="list-style-type: none">• ISO 40ft container, fully biological clarification• Use: Industry, Municipalities and Agriculture; Effective reduction of organic load (COD, BOD₅), Nitrogen load and AFS; sanitization• Biogas production• Medium to heavily polluted wastewater; 2900 PE• Expandable up to 8 expansion modules; up to 26000 PE• Engine room, anaerobic stage/fixed bed (pretreatment), membrane activated sludge stage/ultrafiltration		



EXTERNAL OPERATOR OR IN-HOUSE OPERATION?

SPECIFIC COSTS FOR WASTEWATER TREATMENT WITH FLEXBIO PLANTS



FlexBio treatment: Calculation basis are 10 years depreciation, income from gas utilization and all relevant costs.

The operator is always faced with financing issue when investing in an operational wastewater treatment plant. Numerous factors play a role in the decision. When buying or leasing, you operate the system yourself and thus bear responsibility for the efficiency of the sewage treatment plant. Here it is important to know that in addition to the investment, the provision of specialized personnel and equipment is required. Although, in the case of contracting, the specific treatment costs are higher than for own operation, you nevertheless benefit from many advantages provided by an external operator.

You only pay for our services and the use of our system. You benefit from fixed price for treated wastewater, have full cost control, and can focus on your core business.

The diagram on the left gives an overview of specific treatment costs.

INVESTMENT IN AN TREATMENT PLANT ON-SITE OR DISCHARGE TO A COMMUNAL WASTE WATER PLANT?

At a certain size of the waste water producing facility, an indirect discharge (to a central treatment plant) may become excessively expensive. In addition to the fixed sewage fees, often pollution-related surcharges (heavy pollution surcharge) accrue.

In some cases, expansion of business is threatened by the limited capacity of the municipal sewage treatment plant. We offer a compact and profitable solution even for small businesses!

ADVANTAGES OF A FLEXBIO TREATMENT PLANT ON-SITE

- Cheaper solution than indirect discharge
- Suitable also for smaller businesses
- Independence of capacities of the central treatment plant
- Durable and calculable cost control
- Expandable at any time due to the modular design of the FlexBio systems

FLEXIBLE FINANCING

For our modular treatment plants, we offer leasing as a financing alternative. Thus, you can react quickly and flexibly. Therefore, we tailor our contract offers to your specific needs, e.g. by adapting installments or by flexible service models. No type of financing is as flexible as a leasing arrangement. The payment corresponds with the economic benefits of your plant. Everything can be covered optimally by a leasing alternative.

From the beginning the customer benefits economically and becomes owner of the plant after the last installment.

We are happy provide a suitable leasing offer for your planned wastewater treatment plant. We can do this in cooperation with our selected partners and thus, offer you individual solutions for your business- tailored to your requirements, flexible and customer-oriented.

LEASING-BENEFITS

- Protection of liquidity and equity
- Tax benefits through fully deductible rates
- Planning security through fixed leasing rates
- Manufacturer independent financing
- Individual contract design
- Integration of insurance services
- Fast processing, fast decision

SAVE MONEY AND STAY FLEXIBLE!



TECHNICAL SPEZIFICATIONS

Module	Basic module								Expansion module				
	FLEXBIO-AF-050	FLEXBIO-AF-100	FLEXBIO-BBM-050	FLEXBIO-BBM-100	FLEXBIO-AFBB-050	FLEXBIO-AFBB-075	FLEXBIO-AFBB-100	FLEXBIO-AFBBM-100	FLEXBIO-AF-050-E	FLEXBIO-AF-100-E	FLEXBIO-BB-050-E	FLEXBIO-BB-100-E	FLEXBIO-BBM-100-E
Process	Anaerobic filter	Anaerobic filter	Aeration stage MBR	Aeration stage MBR	Anaerobic filter Aeration stage	Anaerobic filter Aeration stage	Anaerobic filter Aeration stage	Anaerobic filter Aeration stage MBR	Anaerobic filter	Anaerobic filter	Aeration stage	Aeration stage	Aeration stage MBR
Process conditions	anaerobic	anaerobic	aerobic	aerobic	anaerobic aerobic	anaerobic aerobic	anaerobic aerobic	anaerobic aerobic	anaerobic	anaerobic	aerobic	aerobic	aerobic
Cleaning performance													
Pollution equivalents (PE) max.	2900	5800	1900	3800	1250	2100	2900	2900	3000	6000	400	800	3800
Degradation of Chem. Oxygen demand Max. kg COD/d.	350	700	230	460	150	250	350	350	360	720	50	100	460
Solids removal / primary treatment	■	■	■	■	■	■	■	■	■	■	■	■	■
Ditrification			■	■	■	■	■	■			■	■	■
Denitrification	(■) ¹	(■) ¹			■	■	■	■	(■) ¹	(■) ¹			
P-elimination (optional)			■	■	■	■	■	■			■	■	■
Hygienization			■	■				■					■
Biogas production	■	■			■	■	■	■	■	■			
Hydraulic throughput volume max. (m³/h)	2	4	6	12	2	2	4	6	2	4	2	4	12
Operating temperature range	25 - 40 °C	25 - 40 °C	10 - 35 °C	10 - 35 °C	25 - 40 °C	25 - 40 °C	25 - 40 °C	25 - 40 °C	25 - 40 °C	25 - 40 °C	10 - 35 °C	10 - 35 °C	10 - 35 °C
Spec. power consumption (kWh/m³)	0,7	0,6	0,8	0,8	1,3	1,2	0,9	1,5	0,7	0,6	1,2	1,1	0,8
Dimensions of the container	20ft	40ft	20ft	40ft	20ft	40ft	40ft	40ft	20ft	40ft	20ft	40ft	40ft
Length	6,1 m	12,2 m	6,1 m	12,2 m	6,1 m	12,2 m	12,2 m	12,2 m	6,1 m	12,2 m	6,1 m	12,2 m	12,2 m
Height	2,6 m	2,6 m	2,6 m	2,6 m	2,6 m	2,6 m	2,6 m	2,6 m	2,6 m	2,6 m	2,6 m	2,6 m	2,6 m
Width	2,4 m	2,4 m	2,4 m	2,4 m	2,4 m	2,4 m	2,4 m	2,4 m	2,4 m	2,4 m	2,4 m	2,4 m	2,4 m
Total volume	25 m³	50 m³	25 m³	50 m³	25 m³	35 m³	50 m³	50 m³	30 m³	55 m³	30 m³	55 m³	50 m³
Working volume	20 m³	40 m³	20 m³	40 m³	20 m³	30 m³	40 m³	40 m³	25 m³	45 m³	25 m³	45 m³	40 m³

(■)¹ Only in combination with downstream activation stage (nitrification)

The design approach and design of the treatment plants is carried out in accordance with the preliminary investigations and in accordance with the recognized technical rules of the German Association for Water Management, Wastewater and Waste e. V. (DWA). The following documents are taken into account when designing the plants: DWA-A 131, DWA-A 222, ATV-DVWK-M 206, DWA-M 217.

CONTACT PERSON



FlexBio Technologie GmbH
Otto-Hahn-Straße 7a
37574 Einbeck
Germany
phone: +49 5561/980 901
fax: +49 5561/980 9079
mail: info@flexbio.de
www.flexbio.de