



**WEBER  
ENTEC**

**INCREASED  
GAS YIELD**

**IMPROVED  
FLOW PROPERTIES**

**OPTIMISATION  
OF SUBSTRATES**

**INCREASED  
RELIABILITY**

**DesiUS AT BIOGAS PLANTS**

**EFFICIENT OPTIMISATION OF BIOGAS PLANTS**





## WEBER ENTEC - THE COMPANY

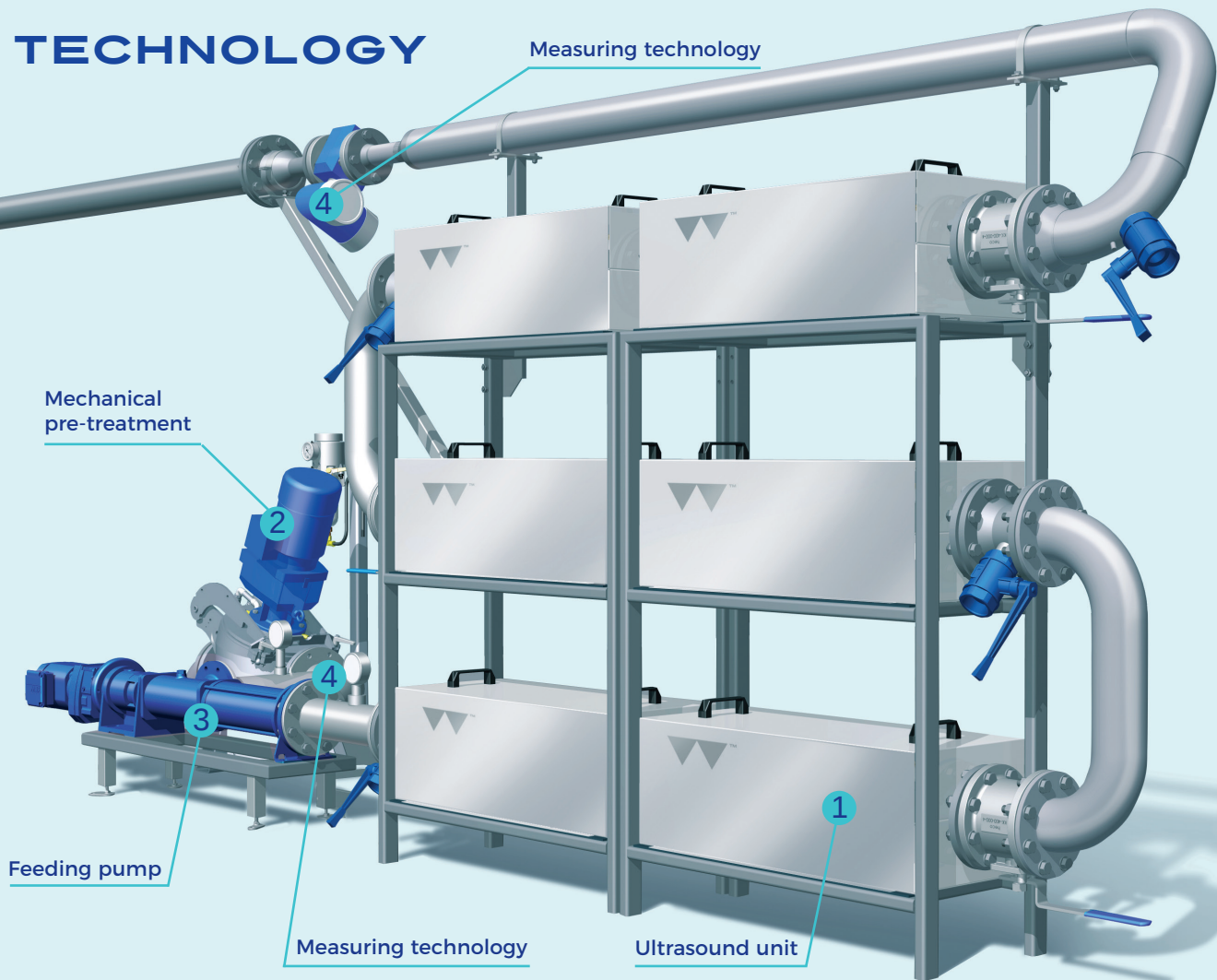
Weber Entec GmbH & Co. KG is a subsidiary of Weber Ultrasonics AG, one of the global leaders in ultrasonic components. The main focus of Weber Entec is the turnkey design and construction of ultrasound based applications in environment technology, especially ultrasonic treatment of biogenic materials also known as disintegration. Because of its broad range of expertise, the company is a one-stop source for manufacturing, plant construction, sales, system analysis and process optimisation.

The core technology of the DesiUS (ultrasound disintegration system) is the BioPush flow-through cell, which was specially developed by Weber Entec for agricultural and industrial biogas plants.

## BIOPUSH ULTRASONIC REACTOR

Inhomogeneous substrates with a high dry matter content are a particular challenge for most ultrasonic technology. With conventional systems (e.g. those equipped with rod transducers) the expansion of the cavitation field is severely limited. As a result, the full ultrasonic output cannot be emitted. The BioPush ultrasonic reactor, which forms the technological heart of the disintegration ultrasound system, called DesiUS, generates a homogeneous cavitation field through powerful planar transducers. This new generation of ultrasound is thereby proven to be far superior to the rod transducer technique conventionally used in other applications. The special design of the BioPush reactor avoids any kind of obstruction and is 100 % maintenance-free.

# TECHNOLOGY



## MACHINE DESIGN - HIGH STANDARDS REGARDING EFFICIENCY AND OPERATIONAL RELIABILITY

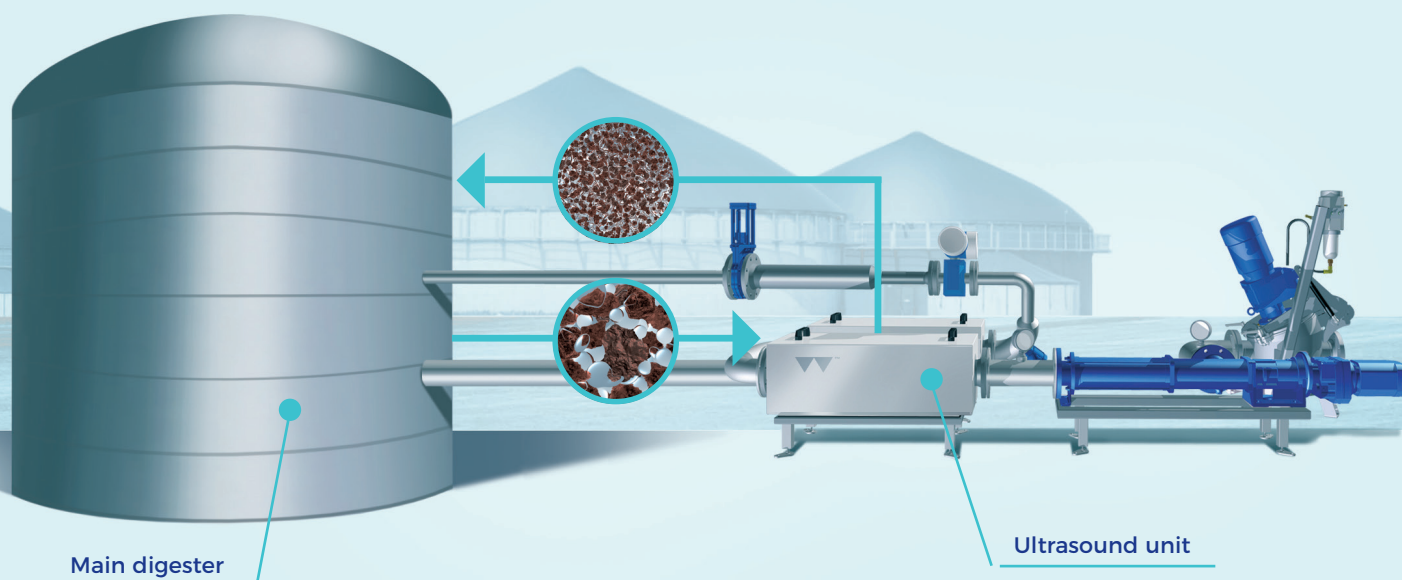
The ultrasonic reactors (1) of the turnkey plant are fed via a progressive cavity pump (3). The substrate passes the sound field at a specific speed such that the ideal specific energy input for treating the substrate is achieved. A macerator (2) protects the machine from hazardous materials (e.g. stones) and pre-homogenises the substrate in order to ensure the optimum ultrasonic treatment.

A PLC-based control system allows robust and reliable operation. Furthermore, the plant is equipped with temperature, pressure and volume sensors (4). The PLC control can be accessed remotely. Using the Siemens touch panel, temperatures, pressures, volume flow, times and other parameters can be set or viewed in a user-friendly manner.

### TECHNOLOGY ADVANTAGES

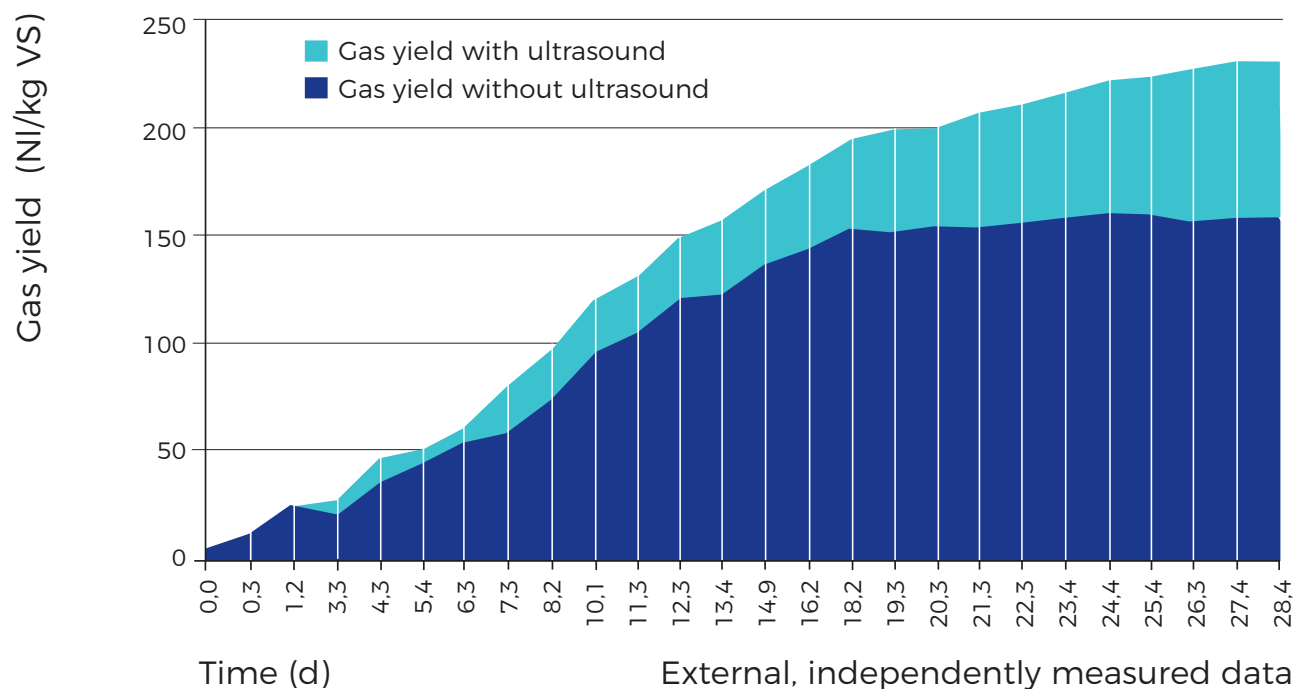
- ▶ Very high energy efficiency – 50 % and more savings compared to other disintegration systems
- ▶ Extremely low-maintenance plant technology
- ▶ High degree of operational reliability
- ▶ Long standing times
- ▶ Can be ideally adapted to the respective requirements
- ▶ Lower space requirement thanks to compact design
- ▶ Simple plug & play installation
- ▶ Quick pay back

## POSSIBLE INTEGRATION



Being adaptable for a variety of substrates, the ultrasonic disintegration system can easily be integrated into existing process technologies without adversely affecting the operation in any way.

## GAS YIELD BEFORE - AFTER



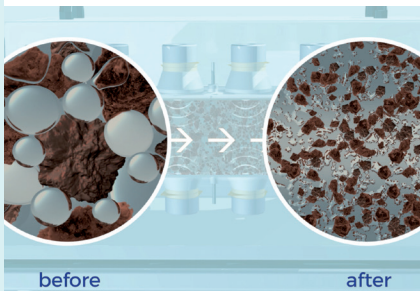
# INCREASED YIELD AND REDUCED COSTS WITH ULTRASONIC DISINTEGRATION

Ultrasonic disintegration is the breakdown of a substrate into microscopic particles using cavitation created by ultrasound. The resulting increase of the surface area causes an acceleration of the organic decay process and material that is difficult to degrade becomes available for the microorganism, which results in an increased biogas yield. Additionally, the substrate in the digester becomes less viscous, which has a variety of positive impacts on the processes of biogas plants.

## PHYSICAL PRINCIPLE

### CAVITATION

- ▶ High energy impulses through cavitation implosion in  $\mu\text{m}$  range
- ▶ Temperatures of up to 5000 °C
- ▶ Pressures of up to 1000 bar
- ▶ High acceleration – high shear forces



Effect of cavitation implosion on the substrate

## EFFECT

### 1. DISINTEGRATION

- ▶ Permanent decrease of substrate viscosity in the digester
- ▶ Improved mixing
- ▶ Increased diffusion
- ▶ Higher organic degradation of the substrate
- ▶ Accelerated degradation process
- ▶ Increased substrate surface area

### 2. MOBILISATION OF EXO-ENZYMES

- ▶ Increased enzyme activity coefficient
- ▶ Accelerated hydrolysis
- ▶ Improved organic degradation of the substrate

## YOUR BENEFITS

### OPTIMISED PROFITABILITY

- ▶ Increased gas yield/substrate savings
- ▶ Significantly increased degree of degradation
- ▶ Stabilisation of biology
- ▶ Improved flow properties
- ▶ Avoidance of floating layers
- ▶ Reduced wear of stirring components
- ▶ Reduced energy requirement for pumps and agitators
- ▶ Use of substrates that are difficult to process but often cheaper can be increased
- ▶ Operational reliability of the biogas plant is increased





## SERVICE

- ▶ System analysis for determining the potential for reducing operating costs associated with biomass
- ▶ Planning, manufacturing, installation and commissioning of a customised disintegration system
- ▶ Measurement and process technical support while transitioning into continuous operation
- ▶ Process optimisation
- ▶ Analysis calculations
- ▶ Quotation and implementation as a turnkey solution – no hidden costs
- ▶ Leasing models available
- ▶ Personal, competent and non-binding advice at any time



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