

**Use a growing source of energy.
Biogas technology from KSB.**



Biogas: A natural choice for the future



Fossil fuel reserves are finite. Energy prices continue to rise. The demand for alternatives is increasing – for energy that is regenerative and CO₂-neutral. Some of these technologies depend a lot on the weather. But biogas facilities run day and night, all the year round. And their output keeps on increasing. At the turn of the millenium, an average decentralised unit produced 50kW. By 2009, that had jumped to 350 kW. However, minimising the facilities' own energy consumption is crucial. Agitators, mixers and pumps all need to run efficiently.

Every valve must be totally reliable. Together, they enable operators to run biogas units efficiently and profitably.

The perfect job for KSB!

Known for its innovative solutions, KSB is a **leader in energy efficiency**, with a long tradition in mixers and agitators. Our **low-speed submersible agitators** are ideally suited to biogas facilities. **So take advantage of all we have on offer!**

KSB – Meet your solutions provider

KSB has over 130 years' experience developing pumps, valves and systems. Our name stands for intelligent all-in solutions for every application. Every day, more than 14,000 employees worldwide support our customers with dedicated research, innovative technology and first-class service. Their common goal is to provide the best products for applications in the water and waste water sector, industry, energy generation and building services. Wherever you need efficiency, reliability and performance: KSB is there with the solutions.

KSB is a member of
the German biogas
industry association



Slowly does it: Amaprop by KSB

Producing efficient bulk flow in large fluid volumes on a minimum of energy: that's where our Amaprop low-speed submersible agitator comes into its own. Its optimised hydraulic system enables this mixer to produce more thrust and consume less energy. A special highlight is its totally break-proof propeller. State-of-the-art technology made by KSB.



Amaprop

Horizontal low-speed submersible agitator

Applications:

Mixing tank, main digester, post digester, final storage tank in biogas installations

Technical data:

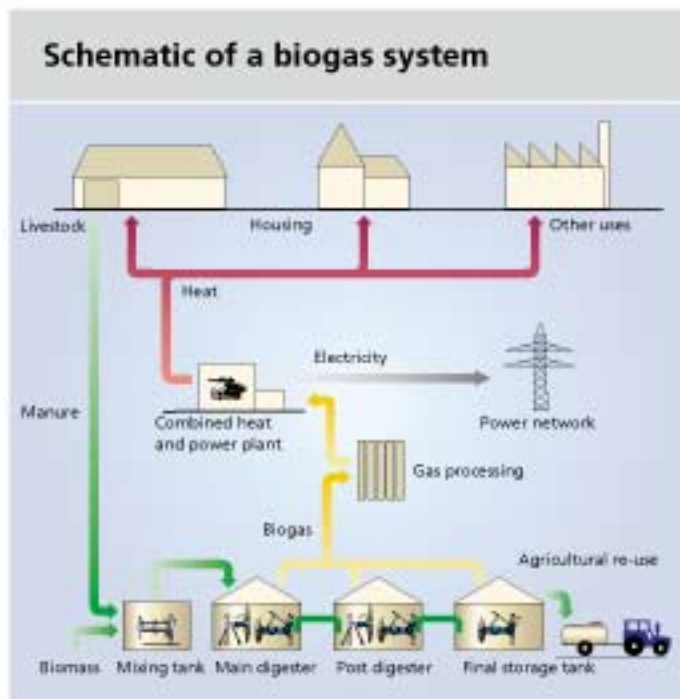
Speed: 20 to 208 rpm
Power rating: 6 to 20 kW
Propeller dia.: 1,000 to 2,500 mm
Temperature: up to 60°C

Benefits at a glance:

- **Absolutely break-proof:** Propeller vanes made of glass-fibre reinforced epoxy resin with metal hub insert and protective gel coating
- **Doubly safe:** Bi-rotational mechanical seal with environmentally friendly oil supply; leakage chamber between oil reservoir and gear unit
- **Perfectly protected:** Absolutely water-tight cable entry prevents moisture ingress into the motor
- **Overheating impossible:** Temperature sensors monitor any heat build-up in the motor
- **Firmly installed:** Reactive thrust forces are fully dissipated to reduce stresses and strains on the guide rail

Create a stir with your clean energy

Whether mixing tank, main digester, post digester or final storage tank: our efficient low-speed agitators are at the heart of every stage of the biogas process. Maximum gas yield depends heavily on precise and comprehensive agitation and mixing of the biomass. KSB solutions help you get the most out of every facility.



Correct mixing is essential. It enables operators to

- **Prevent floating blankets on the surface of the substrate**
thus shifting the chemical balance towards the substrate
- **Avoid sedimentation**
thus increasing the space available for the fermentation reaction. Also, maintenance requirements are reduced.
- **Homogenise the substrate and minimise the "tea cup effect"**
Homogeneous substrates enable optimum biocoenosis
- **Maintain a uniform temperature distribution**
for optimum reaction conditions

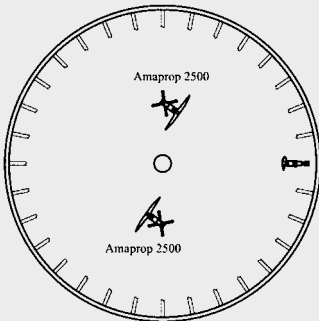
The slower you stir, the faster you save

Comparisons of energy efficiency clearly show the advantage of low-speed submersible agitators. The initial investment is higher than for higher-speed models. But it pays off in less than six months.

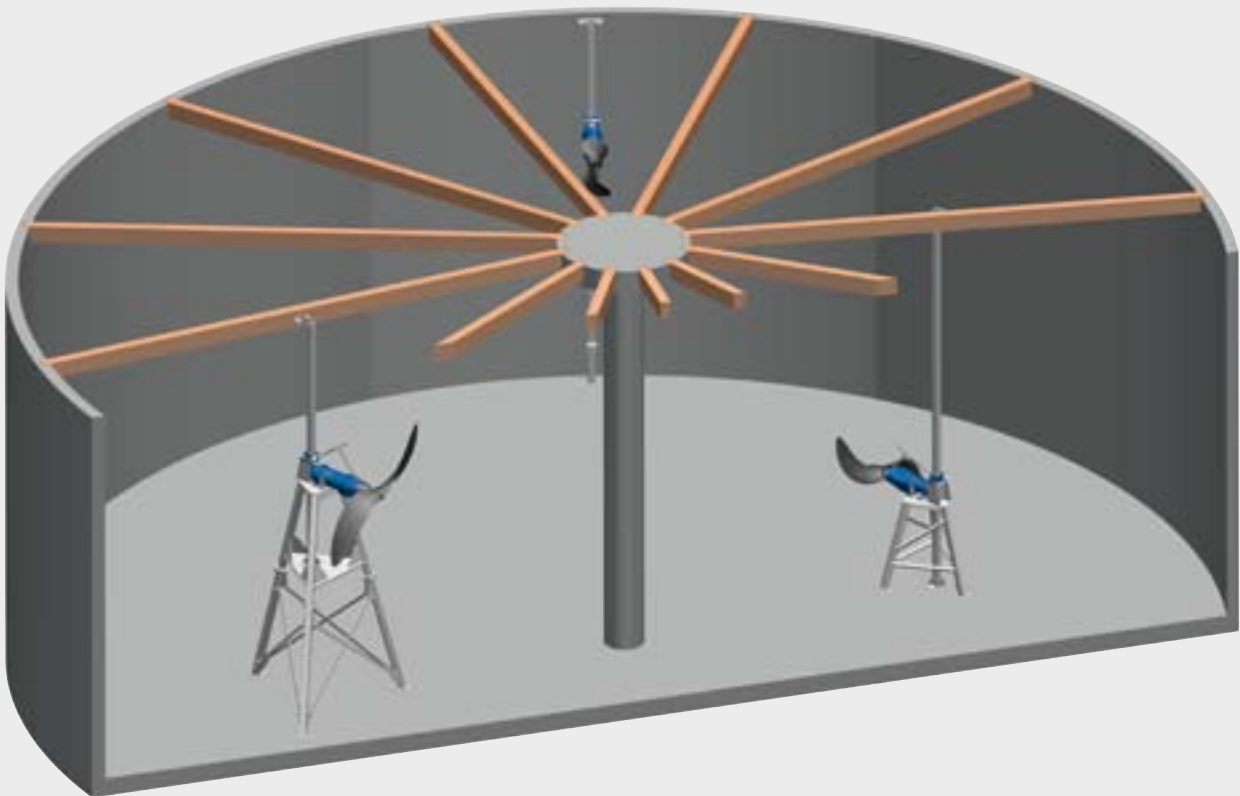
Low-speed agitator cuts energy use by about 73 %

Design	Qty.	Type	Total thrust	Power P1	Running time	Investment	Energy input
Higher-speed mixer	4	Amamix	8,500 N	41.88 kW	30 min/h	4 x € 5,000 = € 20,000	20.94 kW
Low-speed agitator	2	Amaprop	8,500 N	11.04 kW	30 min/h	2 x € 12,000 = € 24,000	5.52 kW
Difference							15.42 kW

A couple that stirs things up: Amaprop and Amamix



KSB provides a reliable and energy-efficient solution to the mixing job: Two Amaprop low-speed submersible agitators with a propeller diameter of 2.5 metres and a power rating of 6.5 kW are positioned at different levels. The bigger propellers move the same amount of substrate at a lower flow velocity, so flow losses are reduced. The mixing process also goes easy on the bacteria. In this configuration, hydraulic power is not introduced from the tank's edge but exactly where it is needed: within the digester. An Amaprop 1000 mounted at the tank wall has been specially developed for biogas applications to combine the effectiveness of a low-speed agitator with the flexibility of a higher-speed mixer.



**Farms grow clean energy:
KSB plugs you in**





Biogas Benitz GmbH, Germany: farming operation and energy producer

Building a biogas plant has given this agricultural business a second source of long-term revenue. Benitz not only covers its own energy needs, but also supplies numerous homes with environmentally friendly electricity and heat via the public networks.

The Benitz manager recognised that making biogas a success would depend on running the facility as efficiently as possible. So he chose the KSB solution: low-speed agitators that use up to 73 % less energy than their higher-speed counterparts.

Two Amaprop low-speed submersible agitators are mounted at different levels in both the main digester and post digester of the two-stage system. They prevent floating blankets and sedi-





mentation, minimise the “tea cup effect” and thus guarantee reliable mixing. The KSB products are also extremely easy to maintain. If necessary, the agitators can be changed without emptying the tanks or interrupting the process.

The biogas plant runs so economically that Benitz now wants to build further on its partnership with KSB. Soon the facility will be producing 1,000 kW and providing even more homes with regenerative energy from the farm.

A combination that works particularly well: Pumps and valves from KSB

As well as Amaprop low-speed submersible agitators, biogas plants also use numerous other KSB products. Together, our pumps and valves ensure smooth substrate handling and trouble-

free processes in the secondary circuits of the connected combined heat and power plant.

Product name	Application	Technical data
Amamix 	Horizontal submersible mixer Mixing tank Benefits: Hydraulic system: Optimised hub and propeller with ECB (Ever Clean Blade) design; two- or three-blade propeller Power: Novel motor concept ensures maximum efficiency Safety: Double-acting mechanical seal arranged in tandem, with oil reservoir to prevent leakage; motor space moisture sensor fitted as standard equipment	Power: up to 10 kW Temperature: max. 60°C Propeller dia.: 215 to 800 mm
Amaprop 1000 	Horizontal submersible agitator Mixing tank, main digester, post digester, final storage tank Amaprop 1000 is universally designed to complement existing agitator set-ups, break up layers of floating sludge and increase flow velocity. It can be used as a stand-alone unit or in combination with Amaprop 2500. The level of installation and upward or downward pitch of the submersible agitator can be adjusted during operation.	Power: 10 kW to 20 kW Temperature: up to 60°C Propeller dia.: 1,000 mm
Amarex KRT 	Submersible motor pump Mixing tank and collecting tank For handling liquid manure and leachates containing solids and gas. Can be flexibly used with single-vane impeller ("D-type" impeller) or free-flow impeller ("F-type" impeller).	Size: DN 40 to 200 Capacity: up to 150 l/s Head: up to 100 m Pressure: up to 10 bar Temperature: max. 60°C Speed: up to 1,400 rpm
Sewatec/Sewabloc 	Dry-installed horizontal or vertical volute casing pump Handling of solids-laden fluids. Available with special single-vane impeller ("D-type" impeller) for handling liquid manure and leachates.	Size: DN 50 to 250 Capacity: up to 1,400 l/s Head: up to 93 m Pressure: up to 10 bar Temperature: max. 70°C Speed: up to 1,400 rpm

Product name	Application	Technical data
<p>Progressive cavity pump</p> 	<p>Dry-installed progressive cavity pump with universal joint Pumping of viscous or highly viscous fluids to maintain the substrate circuit.</p>	<p>Size: DN 25 to 150 Capacity: up to 110 l/s Pressure: up to 16 bar</p>
<p>HERA gate valve</p> 	<p>Bi-directional knife gate valve At the main digester and in the substrate circuit. Body and seat specially designed for non-clogging shut-off.</p>	<p>Size: DN 50 to 250 Pressure: up to 10 bar Connection: DIN 2501 Standards: DIR 98/37/CE Face-to-face length: to EN 558-1</p>
<p>Etachrom NC</p> 	<p>Cooling water recirculation pump Close-coupled pump made of chrome nickel steel for handling pure and aggressive liquids not containing abrasive or solid substances</p>	<p>Size: DN 25 to 80 Capacity: up to 250 m³/h Head: up to 108 m Pressure: up to 12 bar Temperature: -30 to +110 °C</p>
<p>Rio C</p> 	<p>Circulator pump with manual speed control Maintenance-free, screw-ended wet (gland-less) rotor pump with three speed levels for use in hot water heating systems, heat recovery systems, cooling circuits in air-conditioning systems</p>	<p>RP: 1 – 1¼ Capacity: up to 4 m³/h Head: up to 5,6 m Pressure: up to 10 bar Temperature: -10 to +110 °C Speed: up to 2,800 rpm</p>
<p>Hya-Solo E</p> 	<p>Pressure boosting unit Fully automatic, package single-pump unit with 8-litre membrane-type accumulator, pressure-controlled starting and flow-controlled stopping, for use in fire-fighting systems for residential buildings, department stores and industrial plants, in water supply systems for residential and office buildings, in irrigation/spray irrigation and rainwater harvesting systems, in service water supply systems in trade and industry.</p>	<p>RP: 1¼ Capacity: up to 6 m³/h Head: up to 50 m Pressure: up to 10 bar Temperature: +60 °C Speed: up to 2,900 rpm</p>

Your local KSB representative:

Placeholder for local KSB representative information, consisting of four L-shaped corner brackets forming a large square.

More space for solutions.



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