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Technical Teaching Equipment

Biogas Process Unit

EBGB

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Products
Products range
Units
5.-Energy

Electronic console

INTRODUCTION

Anaerobic digestion (also known as methane fermentation) is a biological process that takes place naturally. In this process certain microorganisms break biodegradable material in the absence of oxygen. Biogas obtained in this process is a new energy source used in as a useful means of decontamination and as an alternate source of renewable energy.

Biogas generation through anaerobic breakdown is considered useful when treating biodegradable residues, since it generates valuable fuel, as well as an effluent that can be applied as a soil conditioning substance or generic fertilizer.

This gas can be used to generate electrical energy by means of turbines or power plants working with gas, in ovens, heaters, driers, boilers or other combustion systems working with gas, properly adapted to such application.

The EBGB unit is designed to study and understand the different processes given during the biogas generation through anaerobic breakdown, as well as the study of the different parameters that affect the anaerobic digestion itself and the value of the obtained biogas.

ISO 9000: Quality Management
(for Design, Manufacturing, Commercialization and After-sales service)

European Union Certificate
(total safety)

Certificates ISO 14000 and
ECO-Management and Audit Scheme
(environmental management)

Worlddidac Quality Charter Certificate and
Worlddidac Member

GENERAL DESCRIPTION

The Biogas Process Unit (EBGB) is supplied with two packed anaerobic digesters. In this way, the user can work either in only one stage or in two stages, separating the different phases of the digestion process (the processes of hydrolysis, acidogenesis and acetogenesis would take place in the first digester, and the methanogenesis in the second digester).

Both digesters have a heating blanket that allows to regulate both the appropriate temperature for each part of the process and the operation with different ranges depending on the used microorganisms. Thus, it can operate at the psychrophilic range (room temperature), mesophilic range (temperatures around 35°C) or thermophilic range (temperatures around 55°C).

The unit has four peristaltic pumps which enable the propelling of both the supply to be introduced in the digester and the acid and the base (introduced in two vessels located at the rear side) in order to adjust and control thoroughly the pH in each stage of the process. In case of working in an anaerobic digestion in two stages, one of the pumps carries the product from one of the digesters to the other, passing through a buffer tank which collects the excess of flow from the first reactor. The control of these pumps allows to know the different flows with which the unit is working.

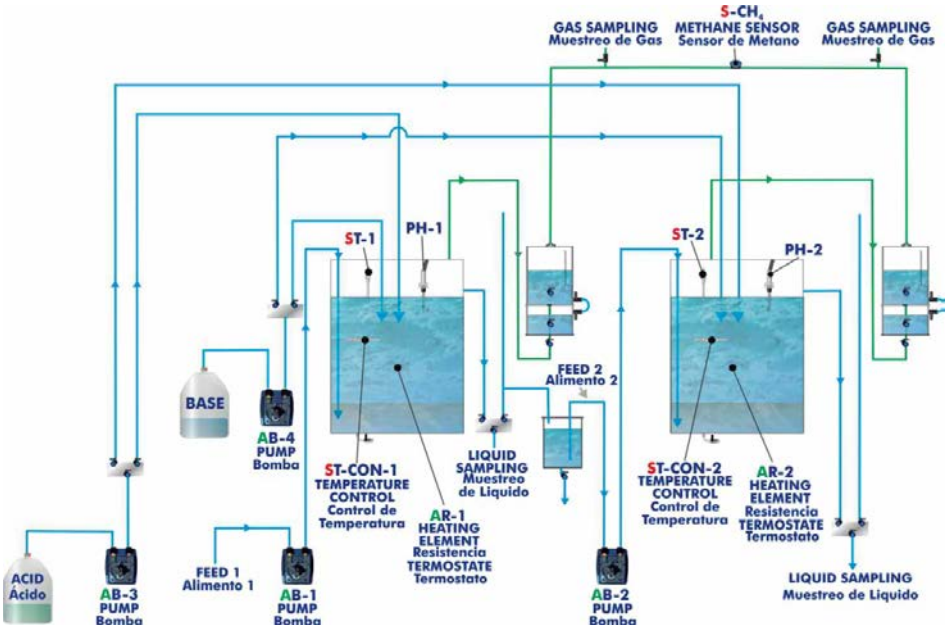
Two volumetric tanks are also included for the storage and volume measurement of the generated biogas. The generated biogas flows through a pipe from the upper side of the digesters to these tanks, where the biogas volume is measured by means of a water displacement. Such tanks have two parts: the upper side is where the generated biogas is collected and the second part, smaller than the first one and located below it, is used to collect the displaced water.

Each digester has a temperature sensor and a pH meter. Their function is to follow the whole process and study the influence of the different controlling parameters in the anaerobic digestion.

Finally, the volumetric tanks, by their upper side, enable the flowing of the collected biogas through a pipe and its passing through a methane (CH_4) sensor. This sensor allows to know the methane concentration in such current. This way, the biogas quality depending on the physical-chemical conditions under which the anaerobic digestion is developed can be determined, as well as its value as a renewable energy source.

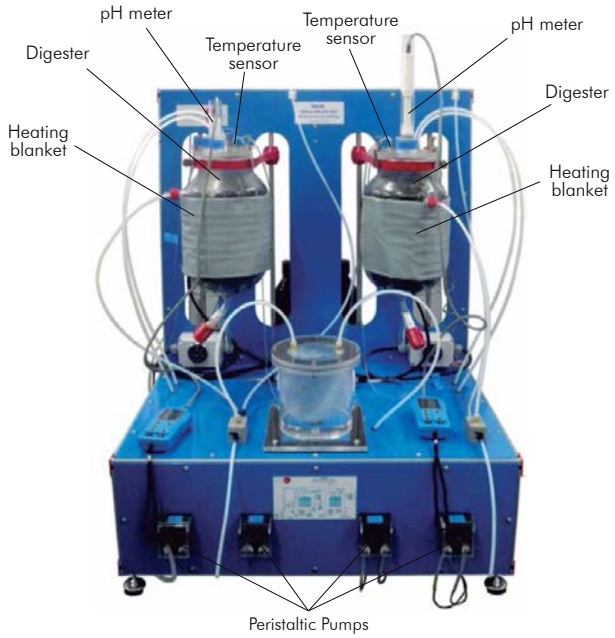
The unit is supplied with the suitable sensors and instrumentation for the most representative parameters measurements and controls (electronic console).

PROCESS DIAGRAM AND UNIT ELEMENTS ALLOCATION

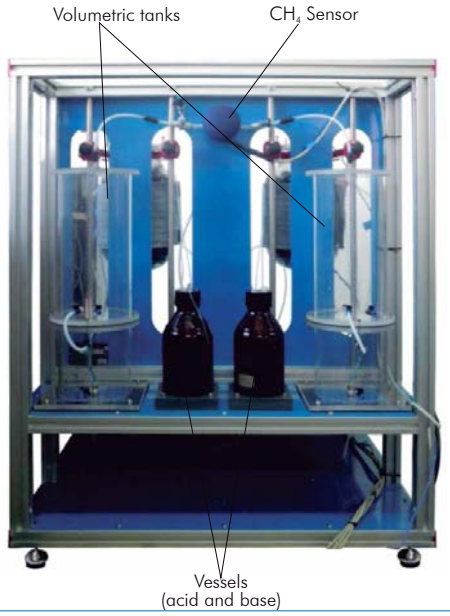


Note: ST=Temperature sensor. PH=pH meter.

Unit's front side



Unit´s back side



SPECIFICATIONS

Anodized aluminum structure and panels in painted steel.

Main metallic elements in stainless steel.

Diagram in the front panel with similar distribution to the elements in the real unit.

2 Packed anaerobic digesters of 5 l. Reactors packing: 25 mm. diameter bactoballs.

2 Heating blankets of 120W with a thermostat and a temperature probe to control the heating temperature. Temperature range: 0-90ºC.

4 Peristaltic pumps.

Feeding flows measurement by the pumps calibration.

2 Volumetric tanks for the storage and volume measurement of the generated biogas.

Buffer vessel, of 1 l. of capacity.

2 Pyrex vessels, of 1 l. of capacity, for the acid and the base.

Methane sensor to measure its concentration in the generated biogas, 0-100%.

2 pH meters, range: 0-14.

2 Temperature sensors, "J" type.

Electronic console:

- Metallic box.
- Temperature sensors connections.
- Digital display for the temperature sensors.
- Selector for the temperature sensors.
- Methane sensor connection.
- Digital display for the methane sensor.
- Pumps switches.
- Pumps controllers.
- Heating blankets switches.

Cables and Accessories, for normal operation.

Manuals: This unit is supplied with the following manuals: Required Services, Assembly and Installation, Starting-up, Safety, Maintenance & Practices Manuals.

EXERCISES AND PRACTICAL POSSIBILITIES

1.- Study of the stabilization process.

2.- Study of the effect of temperature in the anaerobic digestion, purification and quality of the obtained biogas.

3.- Study of the pH effect of the feeding waste water in the anaerobic digestion, purification and quality of the obtained biogas.

4.- Study of the influence of the feeding rate in the anaerobic digestion, purification and quality of the obtained biogas.

5.- Study of the influence of the type of the feeding waste water in the anaerobic digestion, purification and quality of the obtained biogas.

6.- Study of the concentration of nutrients influence of the feeding waste water in the anaerobic digestion, purification and quality of the obtained biogas.

7.- Study of the hydraulic load effect in the anaerobic digestion, purification and quality of the obtained biogas.

8.- Study of the inhibitors influence in the anaerobic digestion, purification and quality of the obtained biogas.

9.- Comparison between the mesophilic and thermophilic anaerobic digestion and their influence in the biogas obtention.

10.-Determination of the optimum operation temperature.

11.-Determination of the optimum feeding rate.

12.-Determination of the optimum solids/water relation.

13.-Determination of the optimum degradable/non degradable solids relation.

14.-Determination of the multistage nature in the anaerobic digestion.

15.-Determination of the kinetics.

16.-Carbon balance.

17.-Solids balance.

18.-Biogas balance.

REQUIRED SERVICES

- Electrical supply: single phase, 220V./50Hz or 110V./60Hz.
- Waste and feeding tank.
- Anaerobic sludge.
- Supply waste water.

DIMENSIONS & WEIGHTS

EBGB:

Unit:	-Dimensions:	1000 x 800 x1000 mm. approx. (39.37 x 31.49 x 39.37 inches approx.)
	-Weight:	70 Kg. approx. (154.32 pounds approx.)
Electronic console:	-Dimensions:	490 x 330 x 310mm. approx. (19.29 x 13 x 12.20 inches approx.)
	-Weight:	10 Kg. approx. (22 pounds approx.)

AVAILABLE VERSIONS

Offered in this catalogue:

-EBGB. Biogas Process Unit.

Offered in other catalogue:

-EBGC. Computer Controlled Biogas Process Unit.

✱ Specifications subject to change without previous notice, due to the convenience of improvements of the product.

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