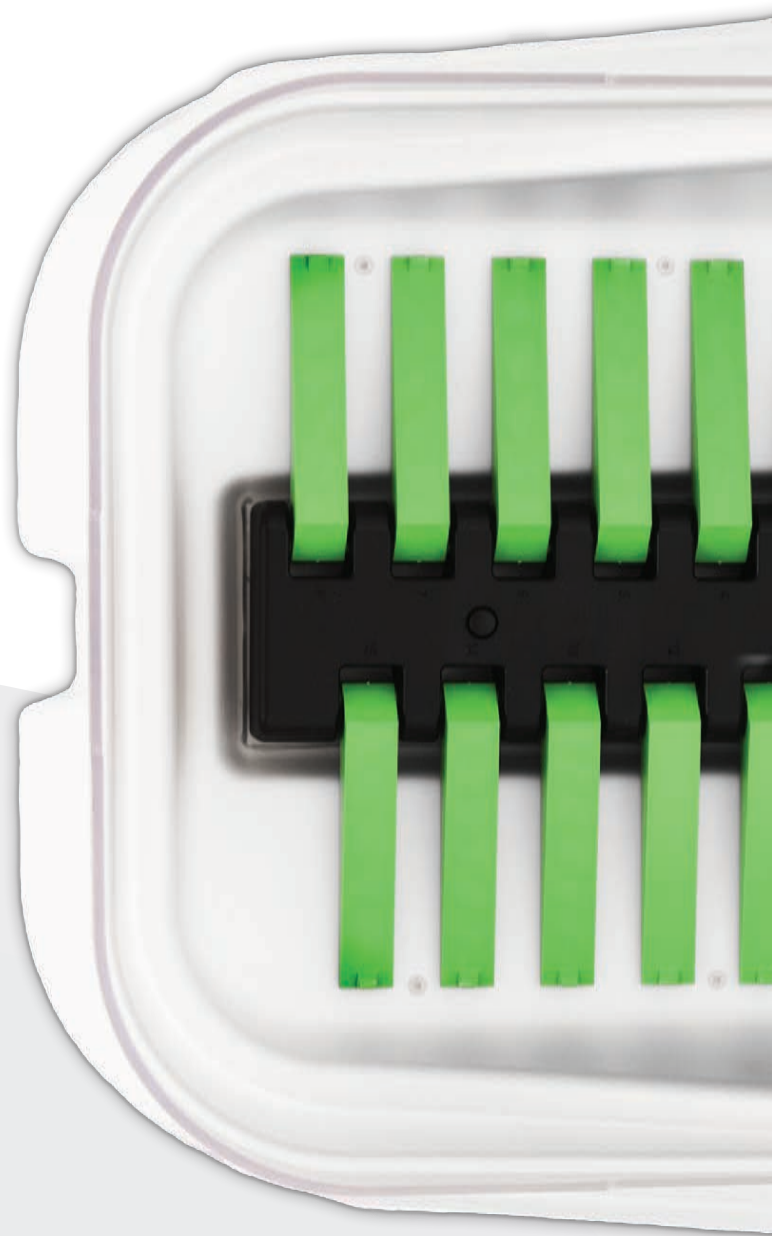


Discover the
benefits of the
AMPTS II



bioprocess
CONTROL

www.bioprocesscontrol.com

Methane potential analysis made easier

Determine the true methane potential

The Automatic Methane Potential Test System (AMPTS) II allows users to determine the true biochemical methane potential and dynamic degradation profile of any biomass substrate.

This in turn will allow users to more easily determine the optimal retention time and mix of substrates for co-digesting, screen proper pre-treatment methods and evaluate the need for additives.

Significantly reduce your labour demands

The AMPTS II is a well engineered analytical device, developed for on-line measurements of ultra low bio-methane and biogas flows produced from the anaerobic digestion of any biological degradable substrate at laboratory scale.

The automated analytical procedure significantly reduces labour demands when compared to traditional methods or competitive solutions on the market.

Standardise and compare results

The AMPTS II is a universal platform for all anaerobic biodegradability, methane potential (BMP) and specific methanogenic activity (SMA) test protocols, allowing for the standardisation of measurement procedures, data interpretation and reports. This allows for data from different laboratories around the world to be easily compared, thus creating value over and above the high quality results obtained from operating the AMPTS II.

Get access to highly precise and accurate data

The real-time performance and outstanding features of the AMPTS II satisfy the highest demands for data accuracy and precision. This high quality data can be used to extract important kinetic information of the degradation process, which in turn provides for a much better understanding of the dynamic degradation behaviour of a specific substrate.

up to
15
cells

10_{ml}
measuring
resolution





The internal software of the AMPTS II runs on an embedded ARM CPU utilising the Linux operating system

Up to 13 litres cumulative gas per channel for each batch test

Outstanding real-time performance

The AMPTS II is an efficient analytical instrument for conducting real-time BMP, anaerobic biodegradability and SMA assays, having sampling, analysis, recording and report generation fully integrated and automated.

A multi-channel analyser consisting of 15 parallel reactors and the same number of gas flow meters (flow cells) attached to a data acquisition system, allows for the real-time investigation of a high number of samples. This unique design makes the AMPTS II an extremely precise and accurate instrument, and with a wide range of applications.

Temperature and pressure compensation

The real-time temperature and pressure compensation feature of the AMPTS II ensures that the impact of measurement conditions can be minimised and data presentation standardised.

The temperature and pressure of gas are measured every time a flow cell opens, allowing the user to derive exact kinetic information compensated for any variation over time, while considering the vapour content of the gas. The normalised volumes are presented under dry conditions at 0 °C and 1 atm.

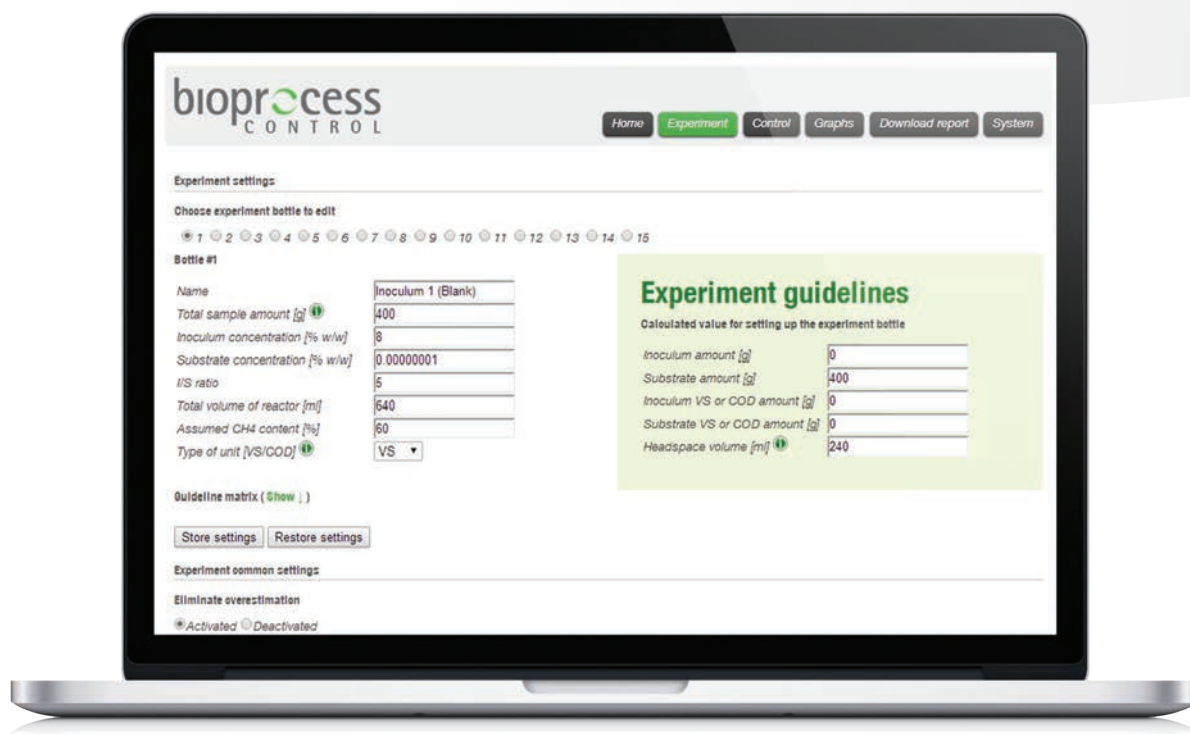
Automatic removal of gas overestimation

Methane gas overestimation arises after flushing the system with an inert gas such as nitrogen. Consequently, carbon dioxide in the newly formed biogas is mistakenly counted as methane gas. This can lead, in some cases, to an overestimation of methane gas production by as much as 20–30 percent, and even more depending on the volume of the headspace. The AMPTS II calculates and removes this overestimation, providing for more accurate and reliable data on methane gas production.

Network ready and easy access

The AMPTS II is designed to allow easy access from a remote location. Through the use of standard protocols and connections, the AMPTS II behaves like any other unit on an internal network, secured by a user definable password. All interactions with the software are conducted through a web browser using any computer. Thus, experiment monitoring can be carried out with any smartphone or tablet device.

Software for AMPTS II



A software application designed for methane potential tests

The AMPTS web-based software application has been specially designed for carrying out methane potential and other related tests. This application, which is easy to understand and navigate, allows users to set-up an experiment, monitor its progress and download results with little effort. Moreover, all data is in a format that allows for easy analysis.

The AMPTS software application is simply a natural extension of an already universal hardware platform that has been designed for carrying out methane potential, specific methanogenic activity and anaerobic biodegradability tests.

A simple and intuitive experiment setup

The Experiment Settings feature of the AMPTS software application allows users to prepare an experiment by calculating and setting up individual data for each batch test.

The user enters values for the total amount of sample, volatile solids (VS) or COD content of inoculum and substrate, inoculum to substrate ratio, total reactor volume, and expected CH₄ content of the produced gas. The software then automatically calculates and generates experiment guidelines for the amount of substrate and inoculum needed in each batch test.

A software application specially designed for methane potential tests



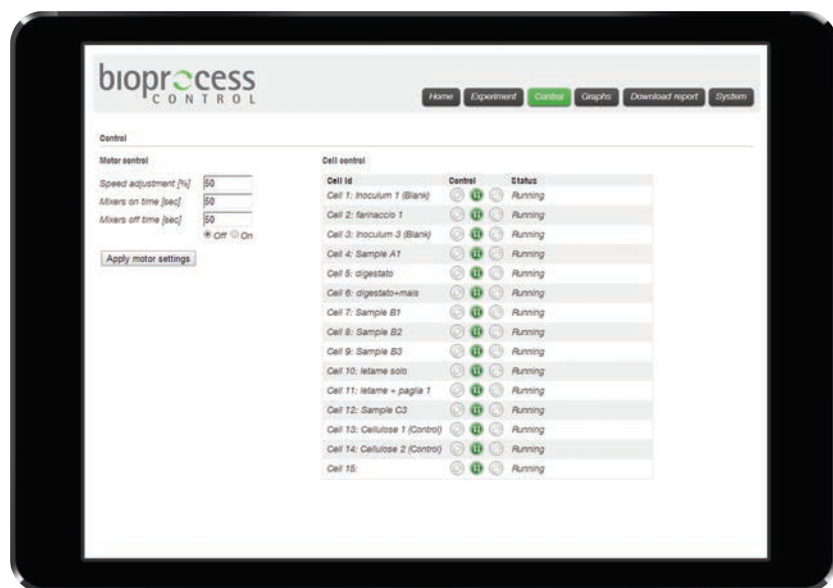
An evolution in
methane potential
analysis

Total control throughout an experiment

The Control feature of the AMPTS software application allows users to control both the mixing of reactors and status of each batch test in real-time during an ongoing experiment. Users can control the interval, speed, rotation directions

and on/off time of mechanical agitation to ensure each reactor is operated under optimum mass transfer conditions. Users can also easily start, pause and stop data acquisition of an ongoing experiment at anytime by means of a simple to use cell control feature, which also indicates the status of a cell at all times.

Overall, this allows users to have optimal control of all reactors and batch experiments at all times with the simple click of a virtual button from the software user interface.



Always have total
control over your
experiment at any
time and any place

See your experiment in real-time and anywhere

The Graph feature of the AMPTS software application and embedded web server allows users to see their experiment in real-time and from anywhere. Users can easily monitor the accumulated gas volume and flow rate of each reactor in real-time by selecting and viewing only the one they wish to see.

Moreover, all values displayed are already adjusted for gas volumes normalized to 1 atmospheric pressure, 0 °C and zero moisture content.

If a flush gas with a different gas composition from biogas is used for establishing an anaerobic condition, the impact of the flush gas is also taken care of by the AMPTS software application.

This flexibility and precision allows AMPTS users to always know the status of an experiment, as well as the data being produced.

Wide user base and application areas

User base

The AMPTS II is currently used by academic scientists, public and private laboratories, energy producers, organic waste handlers, wastewater treatment plants, food producers, bio-ethanol producers, and bio-hydrogen producers.

Application areas

The AMPTS II can be used to conduct specific methanogenic activity tests, anaerobic respiration studies, biodegradability tests, anaerobic toxicity assays and determining the true biochemical methane potential (BMP) and dynamic degradation profile of any biomass substrate.



Technical specifications

Sample incubation unit

Maximum number of reactors per system: 15

Reactor material: glass

Standard reactor volume: 500 ml

Dimension: 53 x 33 x 24 cm

Temperature control: up to 95 °C (203 °F)
(precision of 0.2 °C)

Mixing in the reactor: mechanical agitation (adjustable interval, speed and rotation directions), max. speed 200 rpm



Carbon dioxide absorption unit

Carbon dioxide trap bottles: 15

Volume of carbon dioxide trap bottles: 100 ml

Dimension of unit: 44 x 30 x 6 cm

Absorption liquid: 3 M NaOH with pH indicator, 80 ml per bottle
(not included)

Absorption efficiency: >98%



Flow cell array and DAQ unit

Working principle: liquid displacement and buoyancy

Up to 15 cells running in parallel

Built-in pressure and temperature sensor

Measuring resolution: 10 ml

Detection capacity: up to 13 l cumulative gas per channel for
each batch test

Measuring range for instant gas flow rate: 10 to 120 ml/min

Integrated data acquisition (maximum capacity 2×10^4 flow cell
openings)

Dimension: 51 x 44 x 18 cm

Housing: plastic

Repeatability: $\pm 1\%$



Software and System

- A software application specially designed for biogas potential and anaerobic biodegradability tests
- Web-based software running on an embedded server
- On-line real-time gas flow and volume display
- Automatic real-time pressure and temperature compensation
- Real-time gas flow and volume normalisation
- Algorithm to avoid overestimation of gas flow and volume that may be introduced by flush gas during experiment setup
- Possibility of multiplexing, allowing for simultaneous batch analysis at different startup times
- User friendly guidelines for experiment setup
- On-line system logger for operational diagnosis
- Power supply: 12 V DC / 5 A (Flow cell array and DAQ unit), 24 V DC / 2.7 A (mechanical agitation)
- Usage: indoor

Bioprocess Control – optimising the production of **biogas**

Bioprocess Control is a technology and market leader in the area of advanced instrumentation and control technologies for research and commercial applications in the biogas industry.

The company was founded in 2006, and brings to market more than 15 years of industry leading research in the area of instrumentation, control and automation of anaerobic digestion processes. Today Bioprocess Control has product exports to more than 35 countries.

Bioprocess Control has a broad product portfolio covering biochemical methane potential (BMP) tests, substrate analysis, process simulation, gas flow measurements as well as a series of bioreactors. AMPTS – the Automatic Methane Potential Test System has quickly become the preferred analytical instrument around the world. It is used by both academic and industrial actors in the biogas industry.

Bioprocess Control AB
Scheelevägen 22
223 63 Lund
Sweden

Tel: +46 (0)46 16 39 50
Fax: +46 (0)46 16 39 59
info@bioprocesscontrol.com
www.bioprocesscontrol.com

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Learn more about
the AMPTS II online

