

**Tools for efficient
biogas processes**





Are you looking for professional tools to increase yields and decrease work?

- ✓ determine the best substrate
- ✓ decide if additives are needed or not
- ✓ optimize biogas production

Key facts BlueSens



No sampling – real-time measurements

Avoid manual sampling. Minimize errors and lab work.



Gain scale up and down parameters

Measure accurately no matter if benchtop or biogas plant scale.



Quality made in Germany

All BlueSens analyzers are developed, produced, calibrated and assembled in Germany.

Founded in 2001 in Herten, the owner-managed company is still located in the heart of the Ruhr region, Germany. Everything from development to global sales is handled on over 1000 square meters. The USA is served by the subsidiary founded in 2015.

All products are available worldwide through selected distribution partners.



BlueSens Manufacturing Site in Herten

Facts about BlueSens products

- Continuous real-time measurement
- Automated sampling and calculations
- No hidden costs
- Easy handling – no need for training and workshops
- Standardized procedures

Yieldmaster makes lab life easier

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For people who like to do it right – measuring gas formation potential

To ensure effective biogas production determining the biochemical methane potential (BMP) of the input material is necessary. Yieldmaster simplifies BMP comparison of different substrates and helps to optimize biogas yields.

Using Yieldmaster you don't have to consider minimal gas productions. After starting the experiment, data for gas volume being produced and/or CH₄ concentrations are logged automatically with BlueVIS software.

During fermentation in lab scale Yieldmaster can measure directly in the fermentation vessel. Like this, there will be no loss of data, headspace, as well as errors caused by gas leakage, will be minimized.

Treatment or filtering the gas is not necessary. Combining methane analyzers and BlueVCount results in continuous parallel biogas measurement.

Gas volume produced as well as methane (biogas) concentration values measured are available online at any time.

Key facts Yieldmaster



Modular bio-methane potential (BMP) evaluation system

Microprocessor controlled infrared-gas analyzers, precision volumetric flow-meters BlueVCount and BlueVIS software.



No gas treatment/filtering needed

The analyzers can be installed directly at the headspace or in the off-gas line of any fermenter.



Maximum flexibility

Detection of other important gases besides CH₄ possible.

Technical Short Facts

- Compliant to VDI 4630 and ISO 15985
- No minimal gas flow needed
- Automatic data acquisition



Yieldmaster Set 1

Starter set to connect BlueVCount gas volume counter



Yieldmaster Set 2

Starter set to connect BlueVCount gas volume counter and BCP gas analyzers



Yieldmaster Set 3

This set is for stirring and tempering and can be added as an option to any other set

The perfect addition for Set 4, 5 and 6



Yieldmaster Set 4

Gas volume measurement Pack of 3

Combine with set 1 and you are ready to measure gas volume e.g. biogas production rate



Yieldmaster Set 5

Gas volume & CH₄ measurement Pack of 3

Combine with set 2 to get it running
Combination with set 3 is optional



Yieldmaster Set 6

Gas volume, CH₄ and CO₂ measurement Pack of 3

Combine with set 2 to get it running
> 16 BCP analyzers one more BACCom is required
Combination with set 3 is optional



In-situ real-time determination of methane concentrations

Key facts BCP-CH₄



Fits on every scale

Gain important parameters and measure accurately – no matter if benchtop or production scale.



Wide choice

Each analyzer is for a single gas: CO₂, O₂, CH₄.

Maximum compatibility

A wide range of flow adapters enables compatibility with all kinds of common bioreactors.

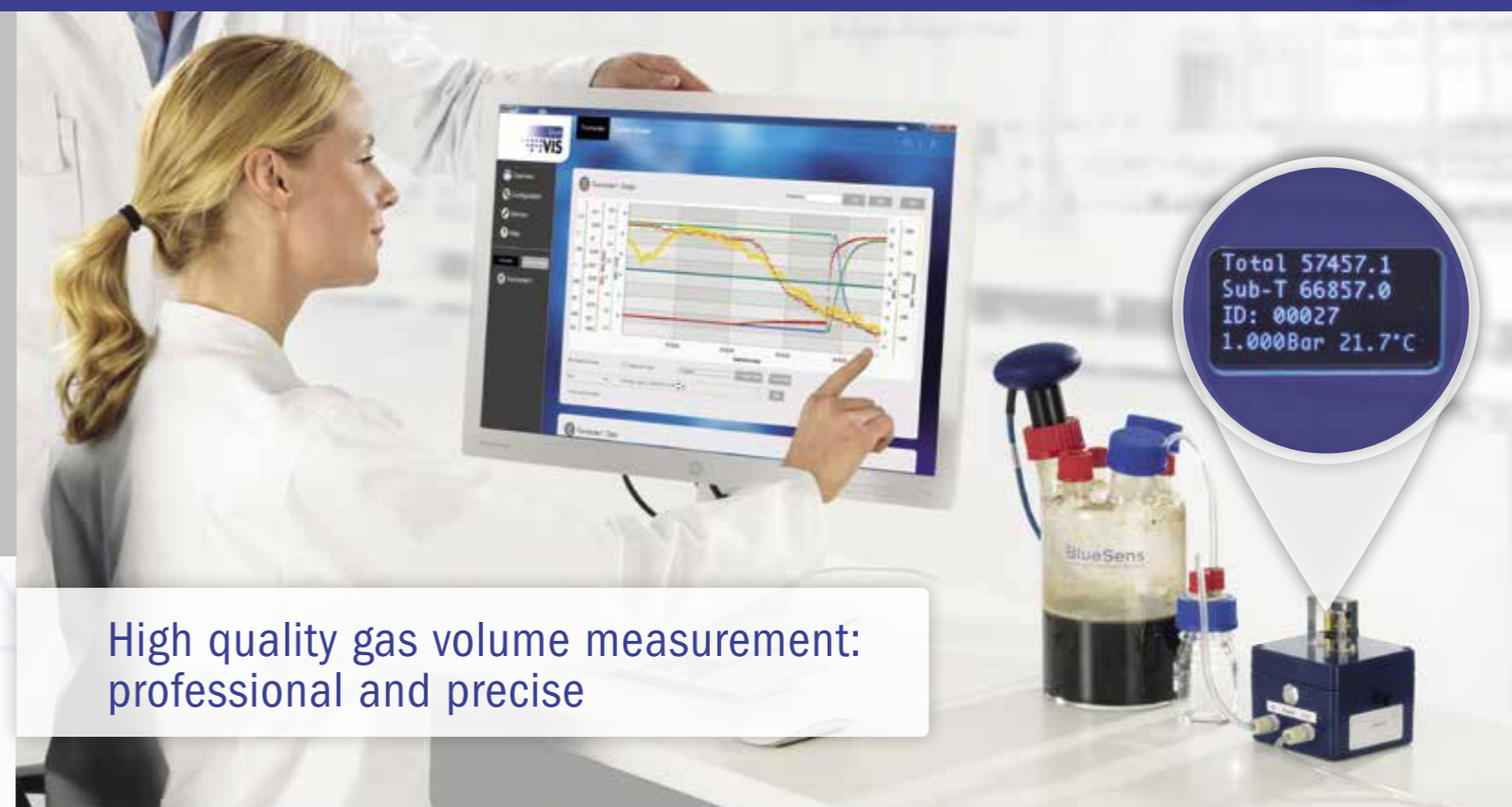
What is it for?

BCP gas analyzers are available for CO₂, O₂ and CH₄. They can be applied **in every scale** starting from shake flasks or anaerobic digesters in the lab up to industrial scales. BCP analyzers allow you to scale up your process using the same technology at every scale step **minimizing variations** and unpredictabilities due to changes in measuring technology at the different scales. They are **easy to connect** directly to the exhaust flow of all types of fermenters and bioreactors (stainless steel, single-use or glass).

All BCP-analyzers are available PA (mushroom) casings.

BlueSens BCP series – your benefits from continuous off-gas analysis

- in-situ gas analysis → non-invasive measurement directly where it happens
- flow and scale independent
 - one type of analyzer (technology) type for all scales
 - less variations and unpredictable influences
- direct integration in gas pipelines behind the sterile barrier
 - calibrate your analyzer at any time without the risk of contamination
- pressure and temperature compensated automatically leading to high accuracy and process reliability
- universal mounting opportunities for convenient integration on new or existing equipment
- standardized data interfaces for simple connection to any process lead system (PLS)



High quality gas volume measurement: professional and precise

Key facts BlueVCount



More process information

Leads to less number of experiments and optimized yields.



Auto compensation

Shows standard volume because of integrated pressure and temperature compensation.



Less maintenance

No water or oil refill necessary.



No hazardous substances!

Technical Short Facts

- More process information for a better process understanding
- Leads to less number of experiments and optimized yields
- No water or oil refill necessary
- Shows normalized volume because of integrated pressure and temperature analyzers
- Integrated display for data information at any time
- Combinable devices (daisy chain) for less cable tangle
- BlueVIS ready via Modbus RTU for higher grade of automation

What is it for?

BlueVCount measures **gas volumes** in reactions of all kind. It is applicable for fermentation, degradation studies, substrate comparison studies, wastewater treatment, bioethanol or hydrogen production and is especially helpful in **bio-methane potential (BMP) determinations** in industry and academia. Gas volume measurement delivers important information about the process and **helps to optimize yields** and process procedures.

How does it work?

BlueVCount is a volume measuring unit with a 1 ml cylinder that is equipped with an oil (special) sealed magnetic piston. It counts how often 1 ml gas comes through the cylinder and reports it to the integrated display or via Modbus RTU to a software (e.g. BlueVIS). To achieve this you do not need a minimum flow.

What do you need?

Your demands	BlueVCount
Minimum flow	No need
Maximum flow	80 ml/min
Accuracy	± 2 %
Resolution	1 ml
Absorber possible	✓
Limit of data logging	unlimited
Ethernet interface	✗
Modbus (RS485)	✓
Single device available	✓
Gas tank/bag connectable	✓
Auto-compensation of humidity, pressure, temperature to display I _N	✓



The maintenance free variable off-gas analyzer adapting to your needs

Watch animation online:

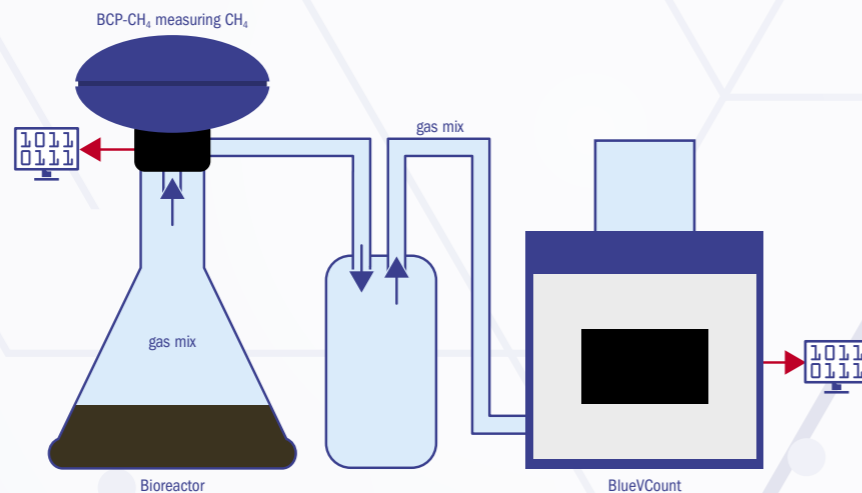


Simultaneous CH₄ and volume measurement

Gas flow measurement using BlueVCount. BlueVCount is directly connected to the gas mix.

Advantages:

- Kinetic data are available
- No chemicals



“Traditional” CH₄ measurement with CO₂ absorption and volume measurement

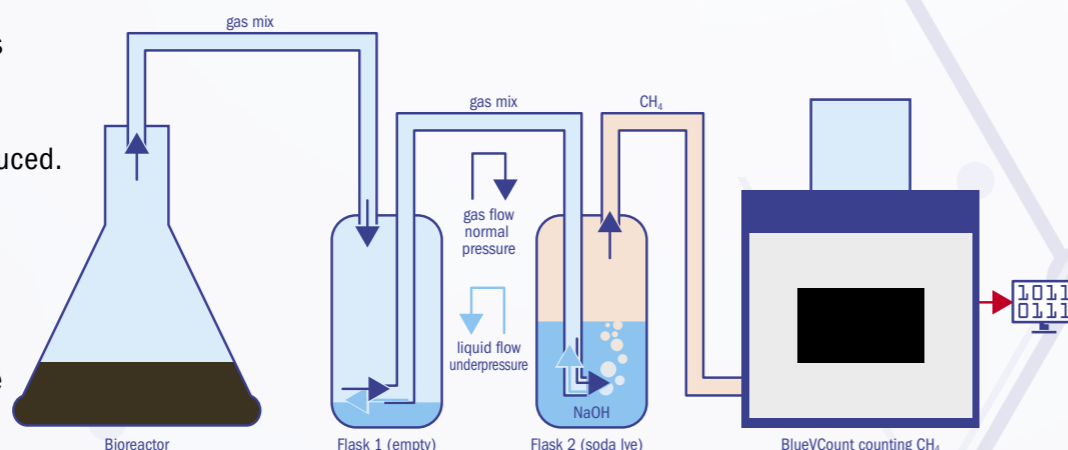
CH₄ measurement using BlueVCount. The gas mix is led through soda lye and BlueVCount measures the amount of CH₄ being produced.

Advantage:

- Less cost

Disadvantages:

- Use of chemicals
- No kinetic data available
- Only total CH₄ volume



BlueVary – maintenance free gas analyzer adapting to your needs

BlueVary consists of a central unit with three plug-in positions for gas sensor cartridges. Two different gases can be measured at once. The third plug-in position holds a pressure or pressure/humidity sensor cartridge. Gas sensor cartridges are selectable according to your application and can be changed easily as required.

Technical Short Facts

- Cartridge plug-in positions
 - 1 for pressure/humidity
 - 2 for two various gas cartridges
- Variable connections and data output options
- Light but robust plastic housing
- Cartridges for CO₂, O₂ and CH₄ available now

BlueVary increases your efficiency

- **One device to cover different measurement tasks**
Choose a suitable gas sensor cartridge for your application.
- **Maintenance free**
No need for offsite annual maintenance – minimizes your downtime.
- **Auto compensated pressure and/or humidity**
No gas cooler, pumps, valves or other gas pretreatment needed.
- **Connectable to any hose/tube or pipe**
Use it on your fermenter of choice.
- **Integrated status display**
See all sensor information and measurement data at a glance.

Key facts BlueVary



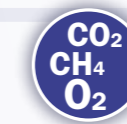
Maintenance free

No need for annual maintenance. Performing our established one-point calibration regularly is all you have to do.



No specific training – easy to install and handle

Install and calibrate it yourself. PC housing and various connections guarantee easy handling.



Maximum flexibility

Combine two gases for parallel measuring (CO₂, O₂, CH₄). Use it also for biogas applications.

Simplify process optimization

- Continuous online fermentation monitoring for cell culture, microbial, algae, fungi or biogas processes.
- Identify metabolic phenomena and obtain vital process parameters.
- Applicable from lab to industrial scale.



Connect what you want!

BlueVIS bioprocess software offers you the possibility to control and monitor several processes simultaneously. Many devices and sensors that are necessary to run a (PAT conform) fermentation process, such as pH and pO₂ probes, pumps, stirrers, mass flow controllers already have digital outputs and can therefore be connected directly to BlueVIS.

Key facts BlueVIS software



Parallel tracking of important process parameters

Monitoring, acquisition and integration of data from all components and for process control in real-time.



Open to other systems and brands

Integrated OPC server/client for data exchange to other systems and programs.



Digital and analog data input implemented

Analog devices can be connected via analog/digital converter.



BlueVIS

Calculates CH₄ volume via Biogas Plugin, offers math sensors and connects to other software.

Data is stored in a database and visualized as freely configurable graphs and can be exported as well.

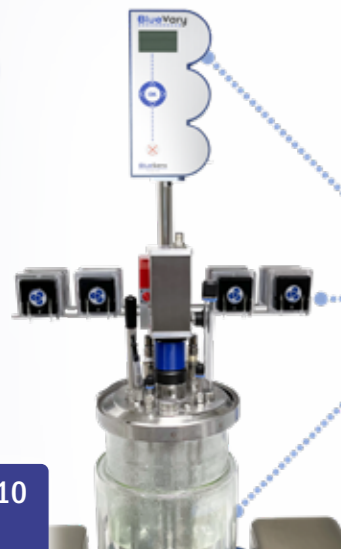
You'll never have to enter offline data manually again -

Here comes BODI - BlueVIS Offline Data Importer



During fermentation data will be collected from **online measurements** like gas analysis, dO-, pH- or temperature. BlueVIS will store this data directly into a SQL database. In that way the data can immediately be used for process control. However, besides online measurements **offline measurements** like chromatography, spectrometric measurements or cell counts are often used e.g. for analysis of the product or biomass. In most cases all this data is written into separate text files and is not accessible for direct process control.

With BODI, this data can be automatically read out and imported into the database. This means it can be used directly for further calculations and process control.



Talk to our experts - it's free!



We'll help you to find the right product! Book your free consultation appointment here: www.bluesens.com/service/online-consulting



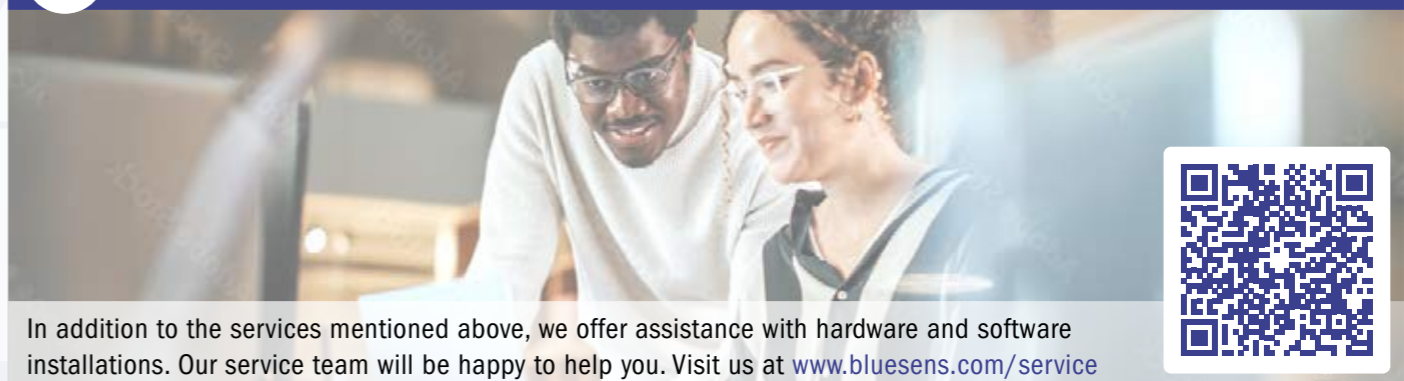
BlueSens Maintenance - Keep your products in good shape



Please remember: keep your sensor in good shape. You can find all information about our maintenance and repair here: www.bluesens.com/service/maintenance



BlueSens Support - we're here for you: personally, quick and competent



In addition to the services mentioned above, we offer assistance with hardware and software installations. Our service team will be happy to help you. Visit us at www.bluesens.com/service



Explore all BlueSens Analyzer for Different Applications

BlueSens products are extremely variable and covering the following areas of application for gas analysis:



Microbiology



Alternative Proteins



Yeast



Renewable Energy



Cell culture



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BlueSens.com

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BlueInOne – dual CO₂/O₂ analyzer

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BCP CO₂/O₂ – single gas analyzers



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Use What You Have – bioreactor modules

V1.0 260302 000

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