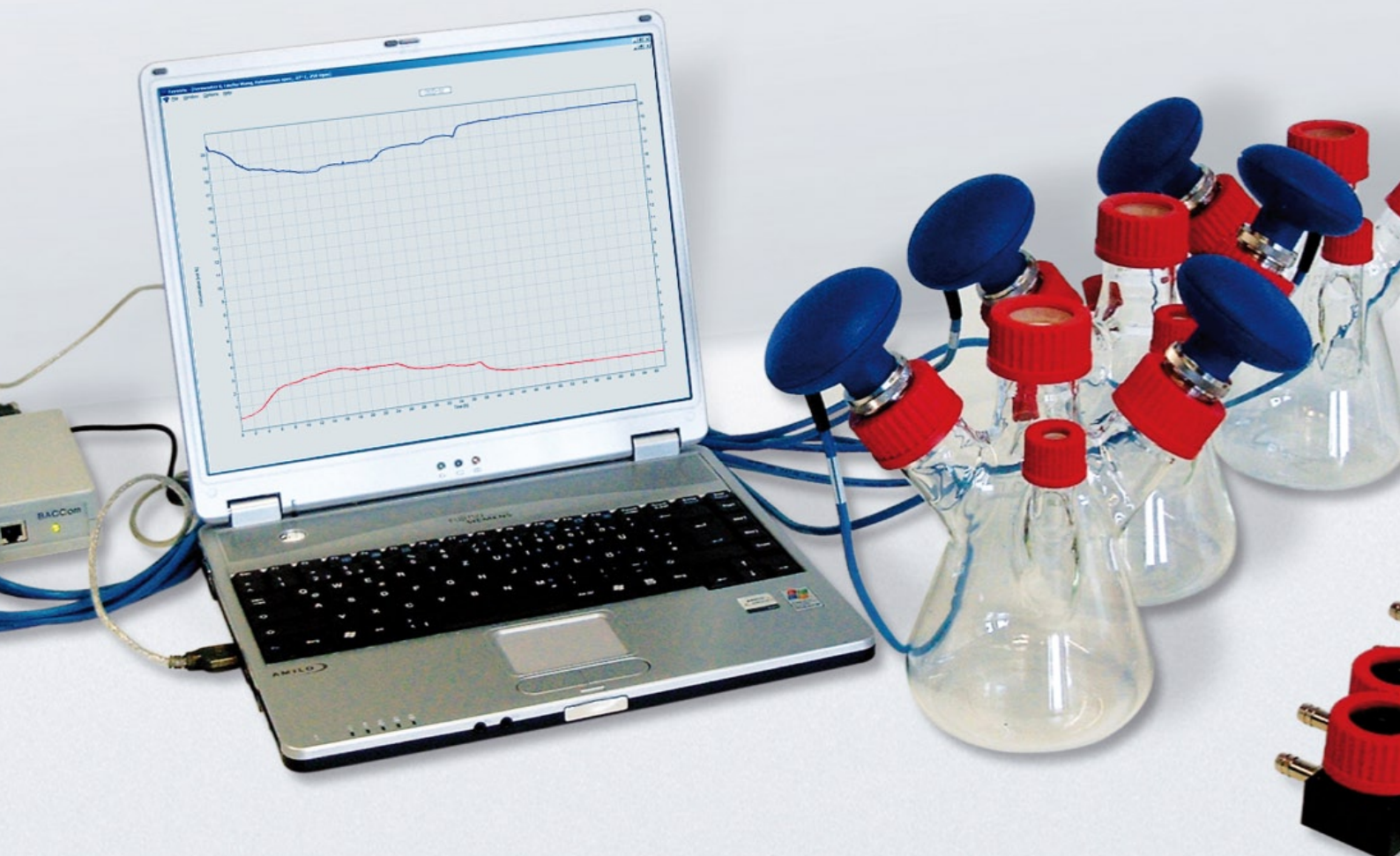


BCpreFerm

**BCpreFerm**



**The analyzing system for the  
scale-up process**

## Advantages & Applications

BCpreFerm by BlueSens is a complete analyzing system made for the analysis of metabolic processes. By the modular structure of the system, BCpreFerm can be connected to shake flasks as well as to fermenters. BCpreFerm can also be added easily to existing bioreactors. In contradiction to central gas analyzers, the use of additional gas coolers, complicated lines, pumps and valves and the complicated processing of gases is not longer necessary. The CO<sub>2</sub>- and O<sub>2</sub>-sensors determine the respective gas concentrations continuously and directly in the fermenter or via a flow adapter.



So you are measuring directly on the spot, where the fermentation process takes place. The data is real time transferred to the data software FERMVis. The parallel measurement of oxygen and carbon dioxide allows the analysis of metabolic processes without interruption and during the cultivation process. The program immediately detects decisive results like the oxygen transfer rate (OTR), carbon-dioxide transfer rate (CTR) and the respiration quotient (RQ). The parallel measurement in several reactors gives a complete overview of measuring data and consequently required results are obtained efficiently and quickly. The metabolic processes can be understood quicker and more comprehensively. Oxygen or substrate limitations can be detected along with metabolic transpositions. Knowledge that is achieved this way in a laboratory scale, can then be transferred to the industrial scale.

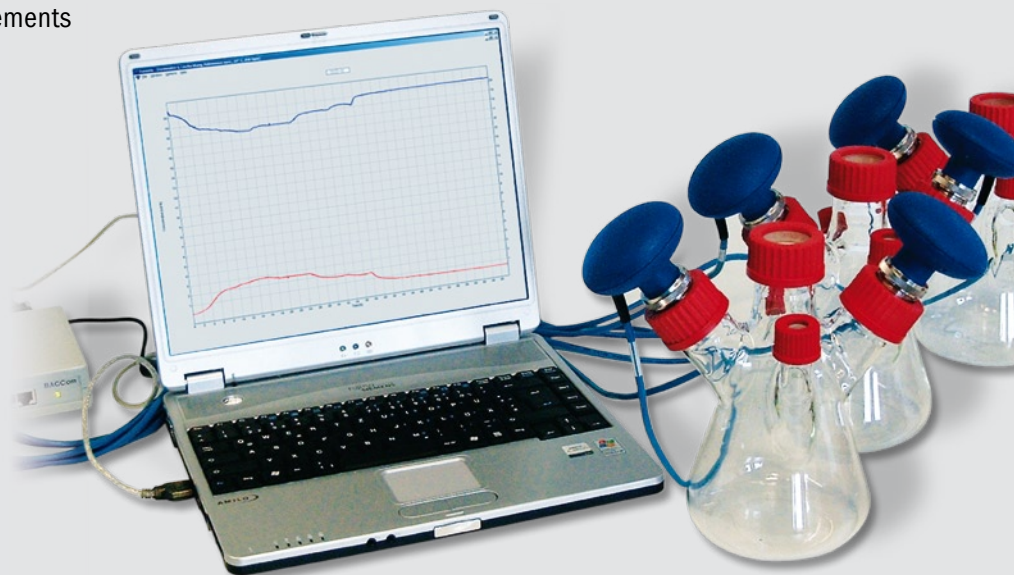
# Scope of delivery

BCpreFerm is a complete analyzing system. It consists of:



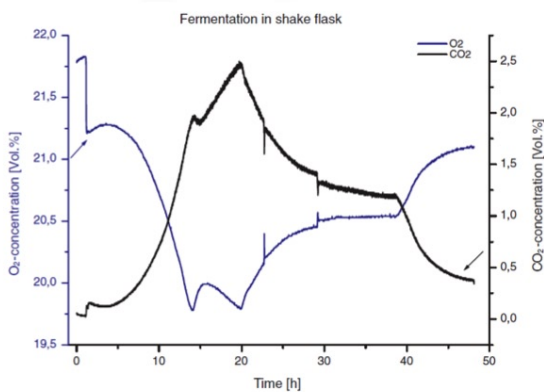
For your individual measuring requirements optionally available are:

- > fermenters of any kind
- > flow adapters
- > precision volumenometers
- > screw caps, gaskets, filters, hoses, etc.
- > incubators, etc.



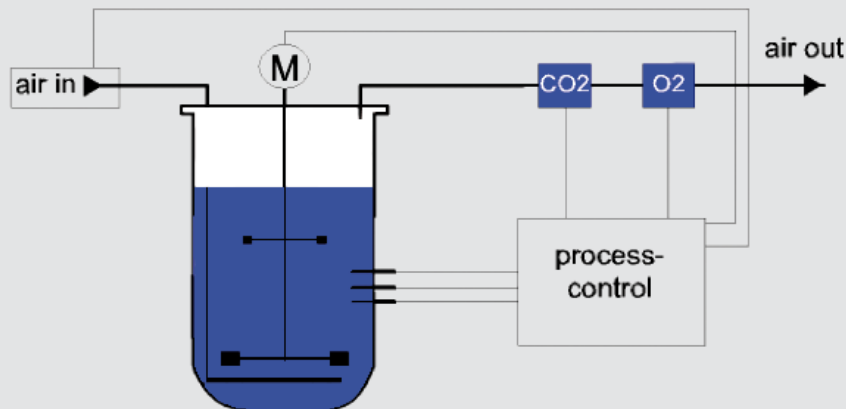
# Process analysis

## Efficiently understand bioprocesses



Bioprocessing means control of biological processes in real time. More information about biological processes means more control options. To better understand these processes, one requires continuous data measurement. The BCpreFerm analysis system efficiently provides you with the data you need to better understand and control your processes.

BCpreFerm allows cost-effective work with quick results.



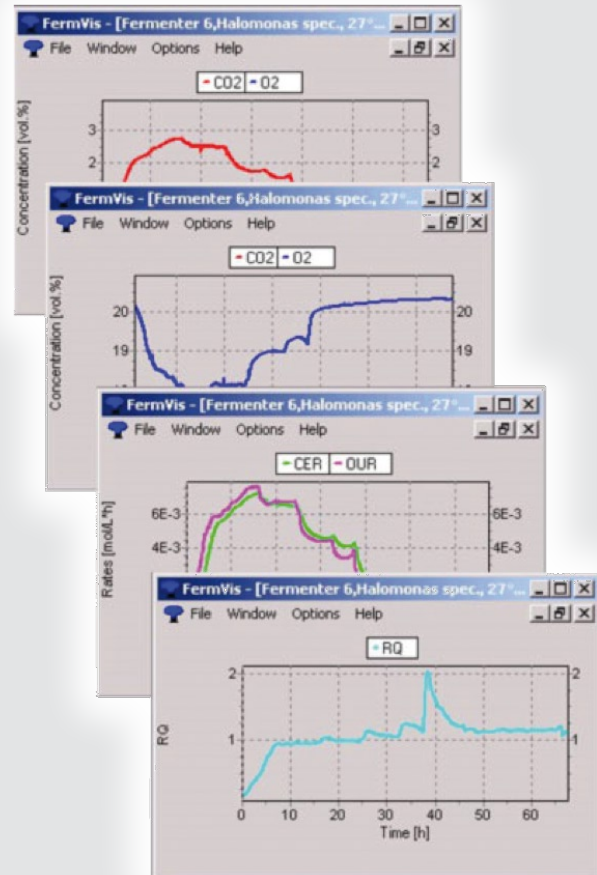
FERMVis allows the parallel monitoring of up to 12 fermenters. So you obtain data about the oxygen uptake rate (OUR), the carbon dioxide emission rate (CER) and the respiratory quotient (RQ). Oxygen or substrate limitations can be detected simultaneously. Moreover, a time-aimed analysis of the required products is made possible.

Metabolic transpositions can be quickly noticed. With a minimum expenditure of time you achieve a maximum of knowledge about the bioprocesses. The more you learn about the bioprocess, the better you will be able to control and automate it to maximized yield.



# Set-Up

BCpreFerm adapts to your individual requirements in the laboratory. The system can be connected to shake flasks as well as to fermenters. For the use of shake flasks the sensors are directly screwed on the flasks by means of a GL 45 screwed connection. For the use of fermenters the gas flow to/in the sensors is realized via hoses and flow adapters. Alternatively the sensors can also be fixed with standardized connections (GL 45, 1¼" Tri-Clamp etc.). By its universal connection options the BCpreFerm analyzing system can also be connected to existing bioreactors.



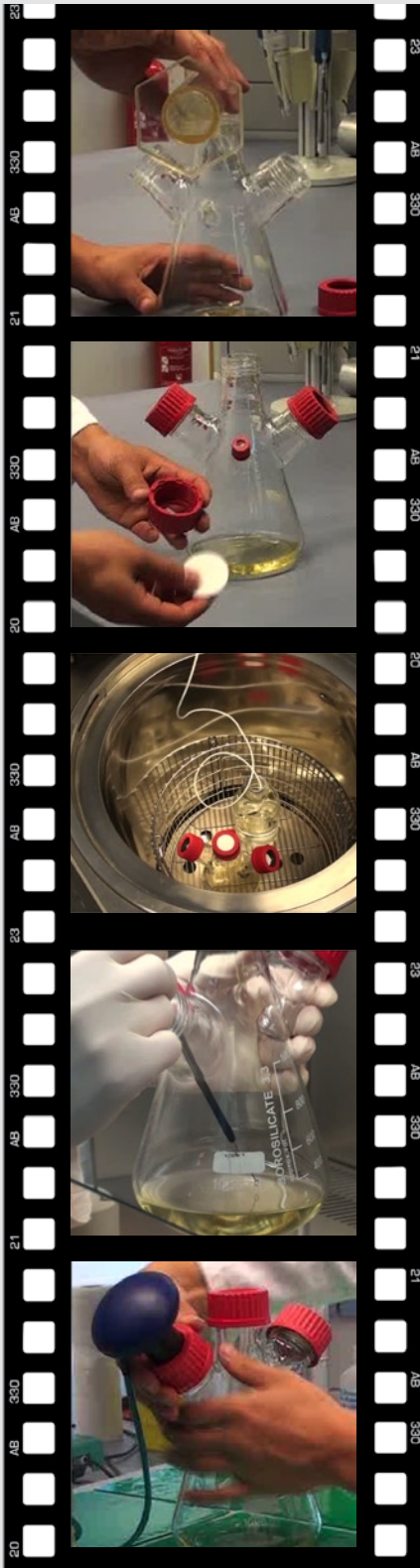
Multiplexer BACCom 12

Moreover, each sensor is connected via data cable to the electronic multiplexer box BACCom. With help of a multiplexer up to 12 sensors can be connected to a laptop or PC via an interface. For the use of more than 12 sensors just add an additional multiplexer box BACCom which can be used for another 12 sensors. Afterwards the FERMVis software is installed on the laptop/PC.\*

\* Win98 or higher

# Set-Up

## Example: set-up shake flask



> flasks are filled with the culture medium

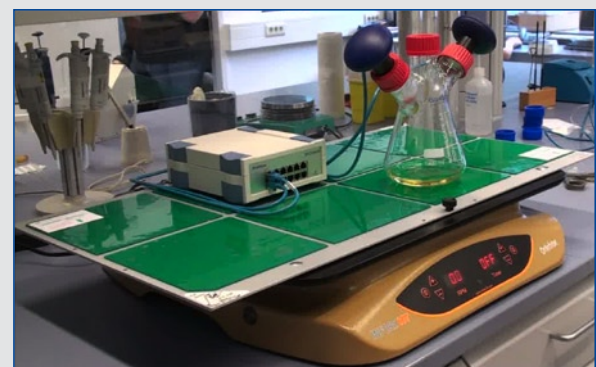
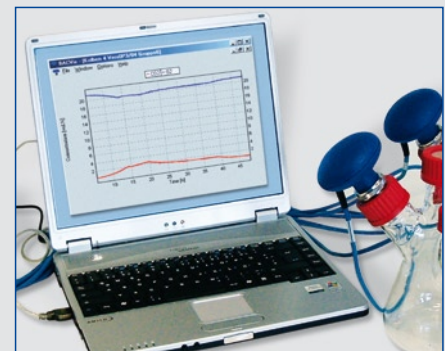
> then flasks are sealed with sterile filters

> flasks are autoclaved

> the culture medium is inoculated

> afterwards shake flasks are fixed on a shake plate

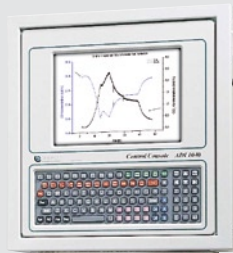
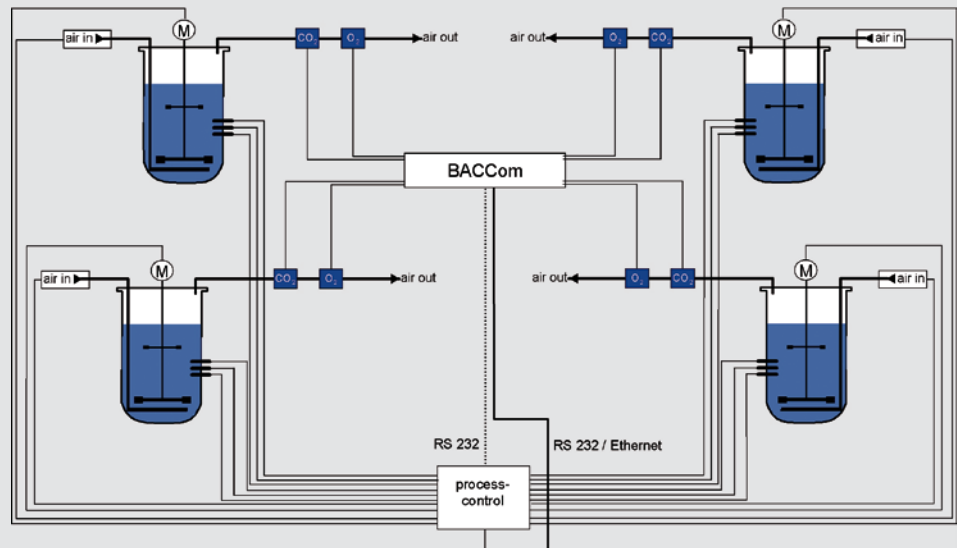
> sensors are screwed on the flasks



> the measurement with FERMVis can start

# Parallel systems

dependable and reliable



The modern in-situ measurement on parallel bioreactors offers various advantages compared to the conventional method with a single central gas analyzer. The parallel measurement of gas concentration directly in every single fermenter saves the installation of complicated gas lines to a central analyzer and also the complicated processing of the gases can be left out.

The identical test preparation in several fermenters reduces the danger to work with incorrect results.

You rely not only on one analyzer, but on many, independent sensors. Furthermore, contamination between the particular bioreactors can almost be excluded.

According to PAT, every single fermenter disposes of an own sensor which transfers continuous real time data to control the process. This is a real advantage in Bioprocessing.

Such a continuous data stream can't be produced by means of the conventional measuring method.

The central analyzers are often extremely cost-intensive to purchase and maintain. Often the entire production process is on hold, if a component has to be changed or maintained. With the use of many, decentralized (PAT) sensors this problem does mostly not come up. When a fermenter is turned off due to maintenance, the remaining bioreactors can continue production without any problems.

With the use of parallel systems you mostly achieve much faster results in research. Under identical terms of cultivation, alternatives can be tested well-aimed in the particular bioreactors and therefore the decisive factors can be determined much faster (DOE).

# Data sheet



Sensor		
Measuring principle	CO <sub>2</sub> : Infrared, dual wavelength O <sub>2</sub> : Zirconium dioxide (do not use in explosive atmospheres)	
Measuring range CO <sub>2</sub>	0 - 10 Vol.%, 0 - 25 Vol.%, 0 - 50 Vol.%*	
Measuring range O <sub>2</sub>	0,1 - 25 Vol.%, 1 - 50 Vol.%	
Long-term stability/Drift	< ± 2% value/year	
Connection tolerance	< 0,2% FS*** ± 3% reading	
Accuracy	< 0,2% FS*** ± 3% reading	
Housing	PA	
Dimension/Weight	80 x 160 mm DxW / approx. 350g ( 0.77 lb)	
Pressure dependence	Compensated: ± 3% reading (range)	
Operating humidity	0 - 100%	
Maintenance	1-point adjustment once a month (ambient air) Optional factory calibration once a year	
Mechanical connector	GL 45**	
Temperature range**	+0 °C - +25 °C	+32 °F - +77 °F
	+15 °C - +40 °C	+59 °F - +104 °F
Storage temperature	+30 °C - +55 °C	+86 °F - +131 °F
	+0 °C - +60 °C	+32 °F - +140 °F
	< 75% RH non-condensing	
Pressure range	0,8 - 1,3 bar**	11.6 - 18.85 psi**

BACCom	
Input	RJ 45 for 12 sensors
Output	RS 232, Ethernet, USB
Power supply	12 VDC, 4A

FermVis	
Display mode	Graph for CO <sub>2</sub> and O <sub>2</sub> concentration Graph and Table for OTR, CTR and RQ
System requirements	Win98 or higher

\*accuracy <0,5% FS ± 5% reading  
\*\* others on request \*\*\* FS = full scale