



**BlueSens –  
Gas analyser for  
bioprocesses**

## Here we are...

BlueSens gas sensor GmbH develops and markets PAT (Process Analytical Technology) conform sensors compliant with FDA for many gases like CO<sub>2</sub> and O<sub>2</sub>.

Founded in 2001 as a specialist for gas analysis in bioprocesses, BlueSens is meanwhile the market leader and supplies the sensors worldwide.

The applications stretch from basic research through GMP production. The innovative structure allows using the sensors without having to take samples wherever gas analysis during bioprocesses makes sense.

### **In-situ gas analysis for process controlling fermentations with CO<sub>2</sub> and O<sub>2</sub>**

Simplest installation of the BCP series on fermenters through

- > Direct installation in the exhaust gas line
- > No sampling
- > No exhaust gas treatment (exhaust gas cooler) necessary
- > Minimum maintenance without test gases
- > Suitable for every fermenter make

That brings along these benefits

- > Simplest process control
- > Increase of reliability and repeatability
- > Metabolic flux analysis and mass-balance calculations



# We help you understand, control and optimize your process!

## BCpreFerm

### Simple tool for process optimization

The same sensors are also used in the **BCpreFerm** system, which is used for process optimization (scale up) for flasks up to large-scale fermenters. The system comprises up to 12 sensors that are linked to a computer via an electronic multiplexer. The related software visualizes the results and can calculate parameters such as the oxygen uptake-rate (OUR), the carbon-dioxide emission rate (CER) and the respiration quotients (RQ) both on fermenters as well as on flasks.

- > Visualization of the process
- > Increase of reliability and repeatability
- > Dedicated process optimization without limitations (e.g. oxygen, nutrients etc.)
- > Predictions for the scale up



## YieldMaster

### Measure the gas yield and quality in every anaerobic process

The unique structure of the CH<sub>4</sub> sensors from **BlueSens** facilitate measuring methane concentrations in processes that sometimes produce much, sometimes little gas. The use of sample taking is impossible there, so conventional systems fail.



The CH<sub>4</sub> sensors are simply screwed onto the fermentation container and measure the methane content directly over the sample. Even at 55 °C (131° F) in water-saturated atmospheres. The accruing volumes are precisely registered via a precision volumenometer (Milligascounter®\*).

The data are registered online with the corresponding software and visualized on the computer. Optionally, **BlueSens** can provide everything as accessories; from the stirrer through the incubator.

#### Additional sensors

To cover as many measurement parameters as possible, **BlueSens** also offers sensors for Ethanol (C<sub>2</sub>H<sub>6</sub>O), Hydrogen (H<sub>2</sub>) and Carbon monoxide (CO).

\* Registered trademark. The MilliGascounter was developed at the University of Applied Science Hamburg under the leadership of Prof. Dr. Paul Scherer.

# BCP sensors overview

The BCP series' exceedingly robust and reasonably priced sensors can be easily integrated directly into the gas lines independent of the gas flow. Additional gas coolers, pumps and valves are not needed to make the measurements.

The sensors measure at the point where things are happening. Fast and reliable measurement data without a lot of maintenance are the result. With the aid of standard interfaces, the sensors can be connected to any process control system or computer.

Sensor	CO <sub>2</sub>	CH <sub>4</sub>	CO	EtOH	BlueInOne Ferm	BlueInOne Cell	O <sub>2</sub>	O <sub>2</sub> ec	H <sub>2</sub>	Sensor	
Measuring range	0 ... 10 Vol. % 0 ... 25 Vol. % 0 ... 50 Vol. % <sup>1</sup>	0 ... 100 Vol. %	0 ... 30 Vol. % 0 ... 100 Vol. %	0.2 ... 25 Vol. %**	0 ... 10 Vol. % CO <sub>2</sub> , 0.1 ... 25 Vol. % O <sub>2</sub> 0 ... 25 Vol. % CO <sub>2</sub> , 0.1 ... 25 Vol. % O <sub>2</sub> 0 ... 10 Vol. % CO <sub>2</sub> , 1 ... 50 Vol. % O <sub>2</sub> 0 ... 25 Vol. % CO <sub>2</sub> , 1 ... 50 Vol. % O <sub>2</sub>	0 ... 10 Vol. % CO <sub>2</sub> , 0.1 ... 25 Vol. % O <sub>2</sub> 0 ... 25 Vol. % CO <sub>2</sub> , 0 ... 100 Vol. % O <sub>2</sub>	0.1 ... 25 Vol. % 1 ... 50 Vol. %	0 ... 100 Vol. %	0 ... 100 Vol. % <sup>3</sup>	Measuring range	
Measuring Principle	Infrared, dual wavelength				Infrared, dual wavelength / ZrO <sub>2</sub>	Infrared: two wavelengths / Galvanic cell	ZrO <sub>2</sub>	Galvanic cell	Thermal conductivity	Measuring Principle	
Accuracy	< ± 0.2 % FS* ± 3% reading				< ± 0.2 % FS* ± 3% reading		< ± 0.2 % FS* ± 3% reading			Accuracy	
Long-term stability <sup>2</sup>	< ± 2% reading / year				< ± 2% reading / year		< ± 2% reading / year			Long-term stability <sup>2</sup>	
Lifetime sensor element	> 3 years				Approx. 3 years CO <sub>2</sub> , 15,000 operating hours (O <sub>2</sub> )	Approx. 3 years CO <sub>2</sub> , approx. 900 000 Vol. h operating hours (O <sub>2</sub> )	15,000 hours	Approximately 900 000 Vol. h operating hours	> 3 years	Lifetime sensor element	
Housing Aluminum, IP 65 Dimension (WxDxH) mm Dimension (WxDxH) inch Weight	100 x 131 x 118 3.94 x 5.16 x 4.64 900 g (1.98 lb)	100 x 131 x 118 3.94 x 5.16 x 4.64 900 g (1.98 lb)	100 x 131 x 118 3.94 x 5.16 x 4.64 900 g (1.98 lb)	100 x 131 x 118 3.94 x 5.16 x 4.64 3000 g (6.61 lb)	170 x 150 x 120**** 6.69 x 5.91 x 4.72**** 3000 g (6.61 lb)		100 x 131 x 118 3.94 x 5.16 x 4.64 900 g (1.98 lb)	100 x 131 x 118 3.94 x 5.16 x 4.64 900 g (1.98 lb)	100 x 131 x 118 3.94 x 5.16 x 4.64 900 g (1.98 lb)	Housing Aluminum, IP 65 Dimension (WxDxH) mm Dimension (WxDxH) inch Weight	
Housing PA6 Dimension (DxH) mm Dimension (DxH) inch Weight	80 x 130 3.15 x 5.12 350 g (0.77 lb)	80 x 130 3.15 x 5.12 350 g (0.77 lb)	80 x 130 3.15 x 5.12 350 g (0.77 lb)	80 x 130 3.15 x 5.12 350 g (0.77 lb)	Not available		80 x 130 3.15 x 5.12 350 g (0.77 lb)	80 x 130 3.15 x 5.12 350 g (0.77 lb)	80 x 130 3.15 x 5.12 350 g (0.77 lb)	Housing PA6 Dimension (DxH) mm Dimension (DxH) inch Weight	
Connecting tolerance	< ± 0.2 % FS* ± 3% reading				-	-	-	-	-	Connecting tolerance	
Material in contact with gas	Steel 1.4571 / Sapphire / Viton / PTFE				Steel 1.4571 / Viton / Sapphire / PTFE / Polymer H.L. / Nitrile / Tygon		Steel 1.4571 / Viton / PTFE		Steel 1.4571 / Viton	Material in contact with gas	
Connection**	G 1¼", GL 45, Tri-Clamp, hose connection 4-12mm etc.				1/4" - 1 ¼****		G 1¼", GL 45, Tri-Clamp, hose connection 4-12mm etc.			Connection**	
<b>General</b>										<b>General</b>	
Operating temperature	max -25 - 55 °C / -13 - 131 °F **				15 - 40 °C / 59 - 104 °F		max -25 - 55 °C / -13 - 131 °F **			Operating temperature	
Storage temperature	0 - 60 °C / 32 - 140 °F / 75% RH non-condensing				0 - 60 °C / 32 - 140 °F / 75% RH non-condensing						Storage temperature
Pressure range (absolute):	0,8 - 1,3 bar / 11.6 - 18.85 psi**				0,8 - 1,3 bar / 11.6 - 18.85 psi**						Pressure range (absolute):
Pressure dependence	compensated: < ± 3 % reading (range)				Integrated pressure sensor		compensated: < ± 3 % reading (range)			Pressure dependence	
Operating humidity	0 ... 100% RF***				0...100% RF, integrated humidity compensation		0 ... 100% RF***			Operating humidity	
Power supply (max.)	12 or 24 VDC, 1 A				24 VDC 1 A	24 VDC 1 A	12 or 24 VDC, 1 A		24 VDC, 1 A	Power supply (max.)	
Output	RS232, RS485, 4-20mA, USB, Ethernet*****				RS232, RS485, 4-20mA, USB, Ethernet*****, Modbus		RS232, RS485, 4-20mA, USB, Ethernet*****			Output	
Maintenance once a month	1-point calibration with ambient air or nitrogen				One point calibration with ambient air once a month (other conditions possible)		1-point calibration with ambient air or nitrogen			Maintenance once a month	
Maintenance yearly	optional factory calibration with certified gases				optional factory calibration with certified gases						Maintenance yearly
CE	EN61326-1:1997 +A2:1998				EN61326-1:2006 / FCC 15:2009 Subpart 107/109, ICES-001:2006		EN61326-1:1997 +A2:1998			CE	

<sup>1</sup> accuracy < ± .0.5 % FS\* ± 5% reading <sup>2</sup> with monthly 1-point calibration \*full scale \*\* others on request \*\*\* not compensated \*\*\*\*\* Ethernet possible with BACCom

<sup>1</sup> accuracy < ± .0.5 % FS\* ± 5% reading <sup>2</sup> with monthly 1-point calibration <sup>3</sup> binary mixture \*full scale \*\* others on request \*\*\* not compensated \*\*\*\*\* stainless steel housing, dimensions depends on flow adapter \*\*\*\*\* Ethernet with BACCom



## Questions?

Please ask directly!  
Phone

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Or visit our homepage:

**[www.BlueSens.com](http://www.BlueSens.com)**