



- **4-gas-mix**

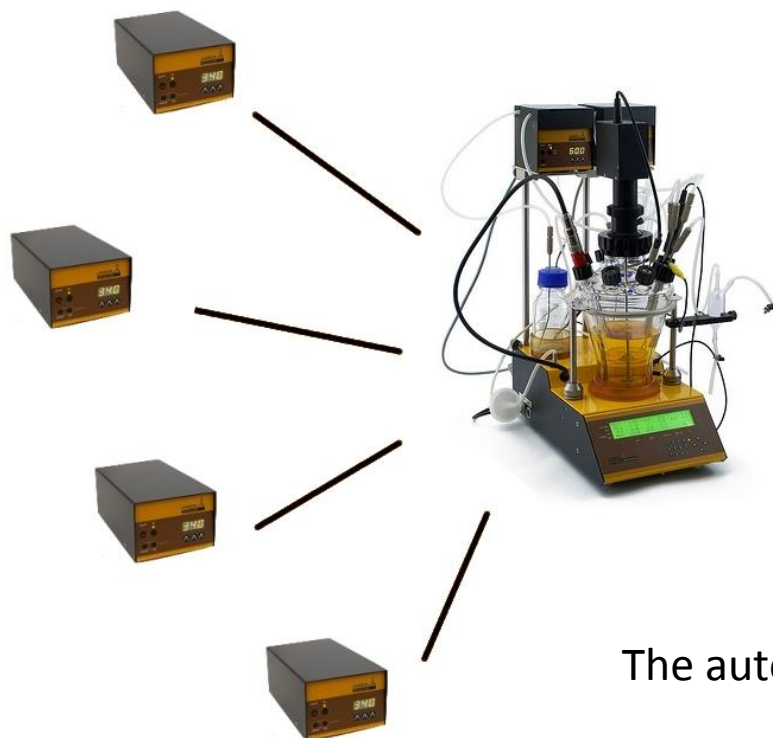
for stem cell & mammalian cell culturing

- **3-gas-mix**

for anaerobe fermentation

- **O2-enrichment**

for microbial systems & biofuel development



## MINI-4-GAS

The automatic gas-mixing module

# MINI-4-GAS: The automatic gas-mixing

What is it about?

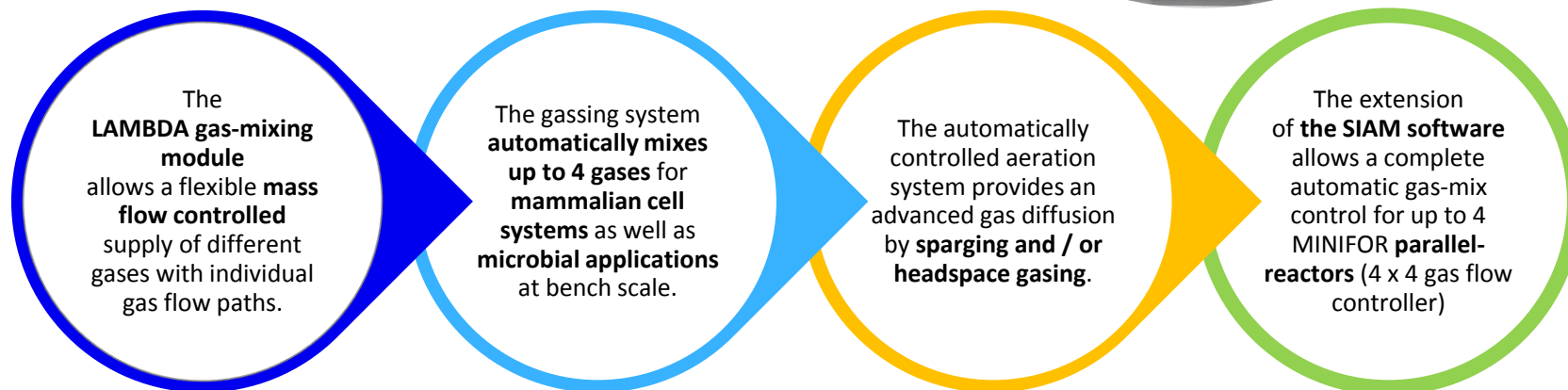
The **MINIFOR bioreactor and fermentor system** is used for growing and testing bacteria, yeast, fungi, mammalian cells and stem cells.

MINI-4-GAS is a module for MINIFOR that allows **fully automatic gas-mix**.

The **MINI-4-GAS consists of MASSFLOWS and PC-Software.**

A MASSFLOWS is measuring and regulating the gas-flow of the gas.

It is controlled by the SIAM software extension.





### MINIFOR bioreactor

(working volume 0.035L - 6.5 L)

- \* Submerge (up to 5L/min)
- \* Headspace (up to 20 L/min)

Out-of-the-box start with the 4-gas connection kit; RS-232 / RS-485 interface.

Porous self-cleaning sparger; pH; pO<sub>2</sub>; (REDOX, pCO<sub>2</sub>); Temperature; Agitation; Pumps.

Anaerobic / Aerobic fermentation; Mammalian cell culture, Long term culture; Batch, Fedbatch, Continuous, Chemostat, Perfusion.

[www.bioreactors.eu](http://www.bioreactors.eu)

### SIAM PC-software

& extension 4-gas-mixing-module

- \* Handles up to 4 bioreactor units with their individual 4-gas controllers.

Process control PC-software; Pre-configured & Installed on Laptop or Notebook; Data storage & Plotting; Data acquisition, calculations & gas transfer rates; trend graphs display; extended visualization.

USB connection port; No software license issues for adding further units and lab instruments. (More than 4 MINIFOR units can be connected even if running without 4-gas control module)

### MASSFLOW

gas flow controller

- \* Free selection of gas types: Air, Oxygen, Carbon dioxide, Nitrogen for high precision; (optional: Methane, Carbon monoxide, ...)

Individual flow rates per gas:

0 – 5 L/min (MASSFLOW 5000),  
0 – 500 ml/min (MASSFLOW 500)

Stand-alone & Programmable or Remote Controlled (by SIAM or MINIFOR); RS-232 / RS-485 interface.

Extremely user friendly; Durable & Reliable; Electrical supply by MINIFOR (optional: stand-alone)

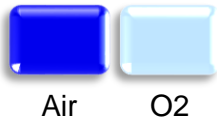


# LAMBDA MASSFLOW

Which gases do your cells need?

Example 4-GAS Mixing for mammalian cells:

**pO<sub>2</sub> control  
& O<sub>2</sub> enrichment**



**pH control by CO<sub>2</sub>**



**Constant gas flow**



**MINI-4-GAS is modular.  
According your project, you can  
choose:**

- The amount of gases
- The type of MASSFLOW for each gas (0 – 5 L/min or 0 – 500 ml/min flow range)

Which gases does your cell culture need?

**Build now your own automatic gas-mixing module!**

The MINI-4-GAS is as easy to interlock as plastic bricks:

The bricks of MINI-4-GAS are LAMBDA MASSFLOWS. **Each MASSFLOW will control one gas** in your gas-mixture.

You can **choose two, three or four gases** for your gas-mix.

The MASSFLOWS will dose and measure the gas flow rates according your set-points (**flow rate / pH / pO<sub>2</sub> / pCO<sub>2</sub>...**)

The MINI-4-GAS **software** (a SIAM extension) is the brain of the gas-mix. The PC-software controls, visualises and saves all gas-flows.

The **MINIFOR bioreactor** dissolve the gases by **micro-sparger**, surface-aeration and excellent stirring with **FISH-TAIL** – a most efficient gas-uptake under **minimized sheering forces**.

# The PC-Software

## The SIAM extension

### Real-time trend graphs

Visualization of the entire process & data storage.



### Individual PID controller for each gas

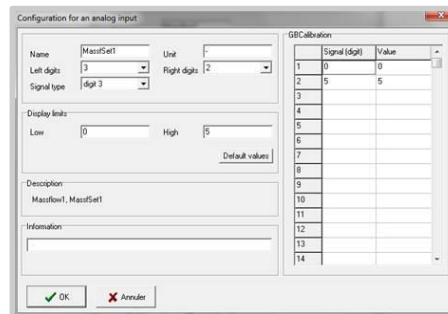
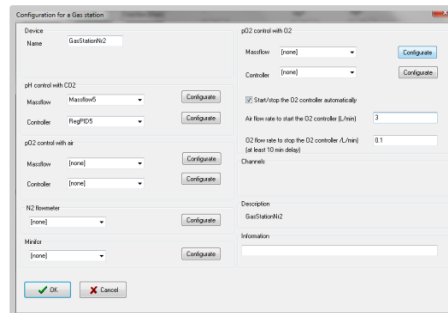
Easy set-point adjustment

Low & High flow rate limits for each gas

**pO<sub>2</sub> control** with Air & Oxygen (O<sub>2</sub>-enrichment)

**pH control** with Carbon dioxide

Optional: **constant total gas flow** (exclusive flow)



### Out-of-the-box start-up!

The SIAM PC-software is an **automation software** for laboratories in biotechnology and chemistry.

SIAM allows the **remote control** and **data storage** during cell growth, production phase of fermentation, bio-transformation and other processes in bioreactors and fermentors.

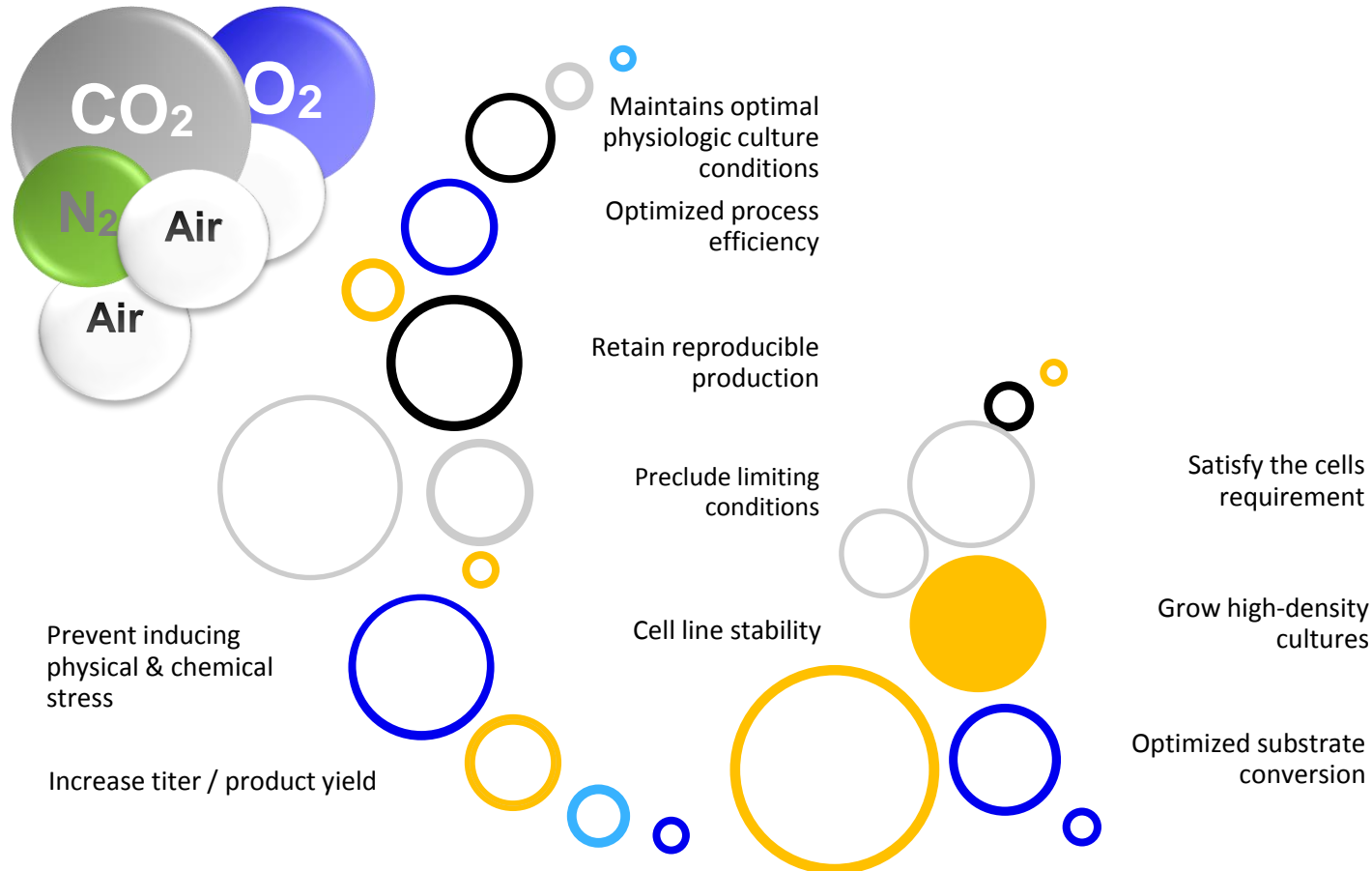
The MINI-4-GAS is a SIAM software extension for **automatic gas-mixing**.

The powerful supervisory process controls the LAMBDA MASSFLOWs.

The **MINI-4-GAS gas-mixing module** is mostly used for **stem cells / mammalian cell culturing** in R&D and **process optimization laboratories**.

The most common application is the **four-gas-mixing system (Air, O<sub>2</sub>, CO<sub>2</sub> & N<sub>2</sub>)**

## LAMBDA advantages



Compared to most bio-transformations with quick growing yeast or bacteria, **mammalian cell cultures** by their low specific growth rates have to be cultured for weeks or even months for satisfying the product yields.

MINIFOR bioreactor offers you the “Lambda Easy Sterility” concept and an excellent peristaltic pumps specially constructed for the **long-term cell cultures**. The MINIFOR with the 4-gas-mixing-module maintains the optimal physiologic conditions for your mammalian cells and the **stem cell cultures** using the **modern control strategies**.

**Controlling the critical process parameters** will help you to optimize the growth rates as well as to achieve the higher titres during protein processing and hormone production.

## Set-up your own gas-mixing station

LAMBDA Item N°	Item Description	Amount for one 4-gas-mix
800012	Additional regulated gas flow LAMBDA MASSFLOW 0-5 l/min)	n
800013	Additional regulated gas flow LAMBDA MASSFLOW 0-500 ml/min)	4-n
4803	PUMP-FLOW INTEGRATOR for Massflow	(4) optional
4816	RS-485 interface	4
4810	Remote control cable for LAMBDA pumps (8 poles)	4
800202	Quadruple plug box (power and RS-connection for up to 4 LAMBDA laboratory instruments)	1
800603	SIAM industrial automation software	1
800603-g	Gas controller software module	1
800602	PC connection kit with RS 485 to RS 232 converter	1
800604	quality brand laptop with Windows 7 operating system	(1) optional
4819-USB	USB to RS-232 converter	(1) optional
800604-4G	4-gas connection kit	(1) optional

## Imprint



### LAMBDA CZ s.r.o.

Lozibky 1  
CZ-61400 Brno  
CZECH REPUBLIC – EUROPE

Hotline: +420 603 274 677

### LAMBDA Instruments GmbH

Sihlbruggstrasse 105  
CH-6340 Baar  
SWITZERLAND – EUROPE

Tel.: +41 444 50 20 71

Fax: +41 444 50 20 72

Email: [support@lambda-instruments.com](mailto:support@lambda-instruments.com)

Web: [www.lambda-instruments.com](http://www.lambda-instruments.com)

