LAMBDA
LABORATORY INSTRUMENTS
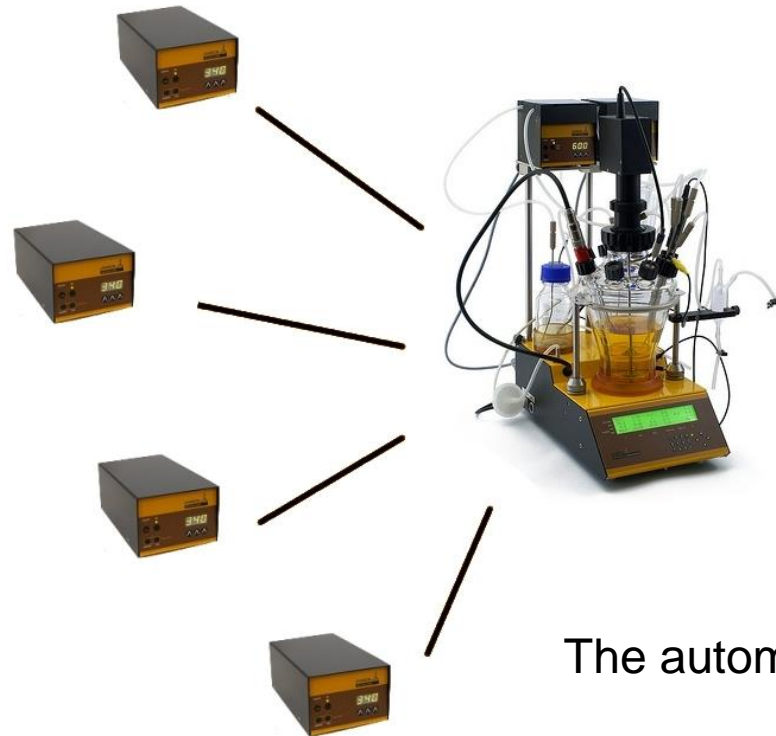
CO_2

O_2

Air

N_2

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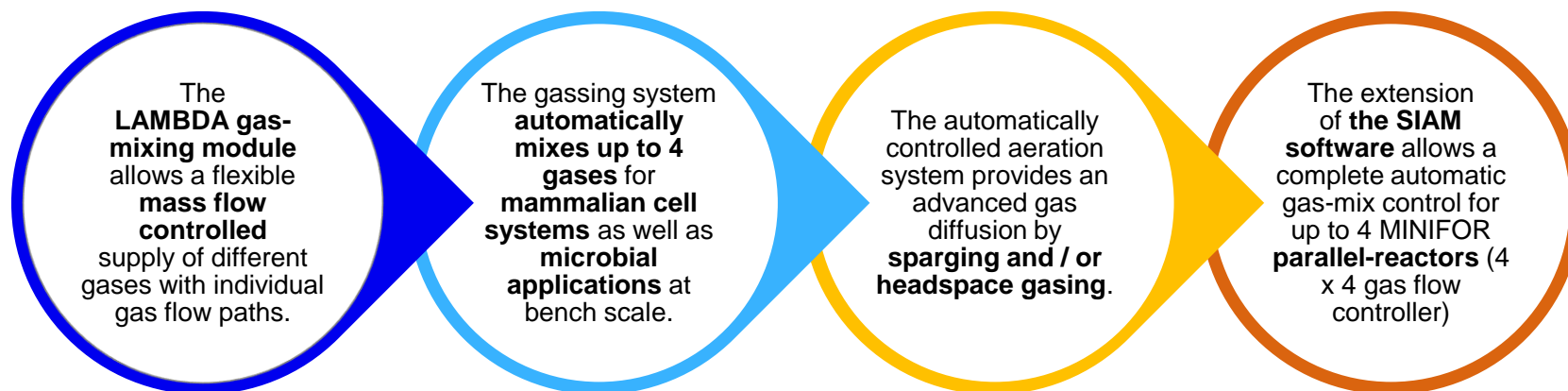
MINI-4-GAS: The automatic gas-mixing

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.

The **LAMBDA gas-mixing module** allows a flexible **mass flow controlled** supply of different gases with individual gas flow paths.

The gassing system **automatically mixes up to 4 gases** for **mammalian cell systems** as well as **microbial applications** at bench scale.

The automatically controlled aeration system provides an advanced gas diffusion by **sparging and / or headspace gasing**.

The extension of **the SIAM software** allows a complete automatic gas-mix control for up to 4 MINIFOR **parallel-reactors** (4 x 4 gas flow controller)

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_2 (REDOX, pCO_2); Temperature; Agitation; Pumps.

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

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;

UBS 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 precison; (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)
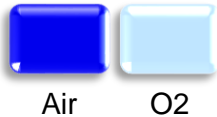
LAMBDA LABORATORY INSTRUMENTS

Air   O2   CO2   N2

Expample 4-GAS Mixing for mammalian cells:

pO2 control
& O2 enrichment

Air   O2

pH control by CO2

Air   O2   CO2

Constant gas flow

Air   O2   CO2   N2

LAMBDA MASSFLOW

Which gases do your cells need?
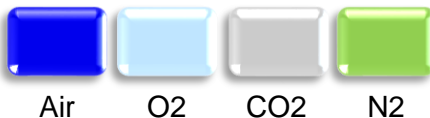
**MINI-4-GAS is modular.
According your project, you can choose:**

- 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 accoring your set-points (flow rate / pH / pO2 / pCO2…)

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

The MINIFOR bioreactor disolve 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

Vizualization of the entire process & data storage.
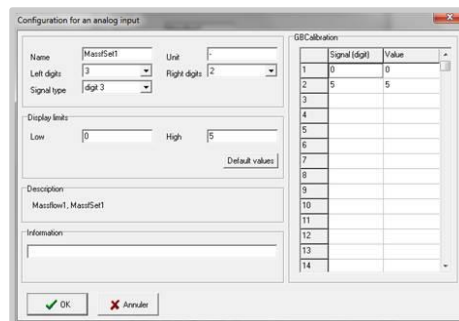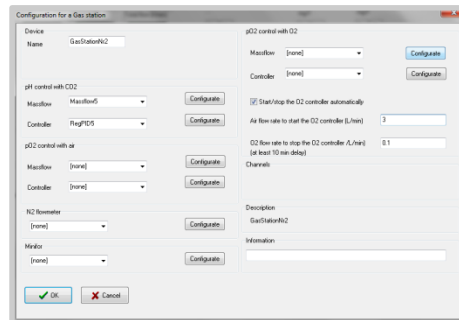
Individual PID controller for each gas

Easy set-point adjustment

Low & High flow rate limits for each gas

pO$_2$ control with Air & Oxygen (O2-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-trasformation and other processes in bioreactors and fermentors.
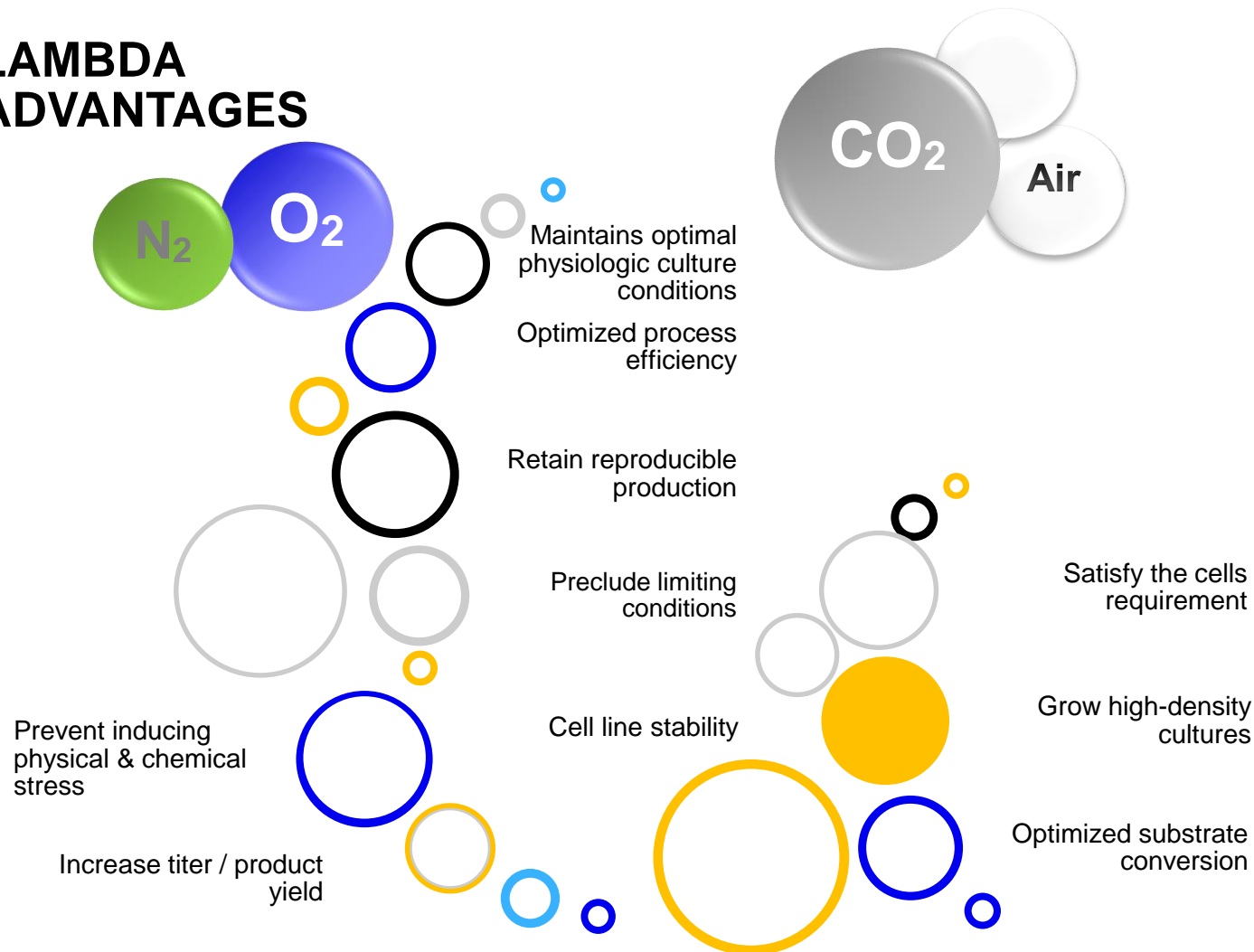
The MINI-4-GAS is a SIAM software extension for automatic gas-mixing.

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 ist he four-gas-mixing system (Air, O$_2$, CO$_2$ & N$_2$)

LAMBDA ADVANTAGES

N₂ O₂

CO₂ Air

Maintains optimal physiologic culture conditions

Optimized process efficiency

Retain reproducible production

Preclude limiting conditions

Satisfy the cells requirement

Prevent inducing physical & chemical stress

Cell line stability

Grow high-density cultures

Increase titer / product yield

Optimized substrate conversion

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.

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-s	Remote control cable for LAMBDA MASSFLOW (5 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
4819-USB	USB to RS-232 converter	1
800604-4G	4-gas connection kit with tubing, 4 reflux valves, 3 y-connections, 4 sterile inlet filter for gas, 1 off-gas filter (vent filters)	1

IMPRINT

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