10

SINGLE & PARALLEL MINI FERMENTERS/ BIOREACTORS

SOLARIS
BIOTECH SOLUTIONS

SINGLE & PARALLEL MINI FERMENTERS/BIOREACTORS

10

IO is a mini fermenter/bioreactor suitable for beginners and experienced users alike.
With total volumes 200ml and 1000ml and two different ratio H/D represents a great innovative device for process development.
PCS is managing up to 24 units with parallel control.

IO typical applications includes the following:
Education & Basic research
Scale-up and scale-down studies
Process development and optimization

IO can be used for:
Biopharmaceutical
Biofuels
Food industry
Bioremediation
Bioplastic
Cosmeceutical
Nutraceutical

WHY TO INVEST IN THIS PRODUCT

Fast and Accurate thermoregulation **without** Water Circulation

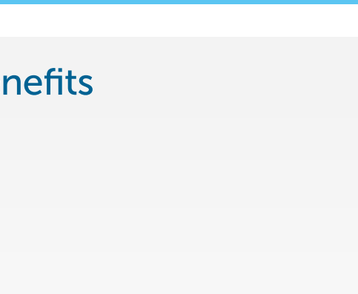
Parallel control up to **24 units**

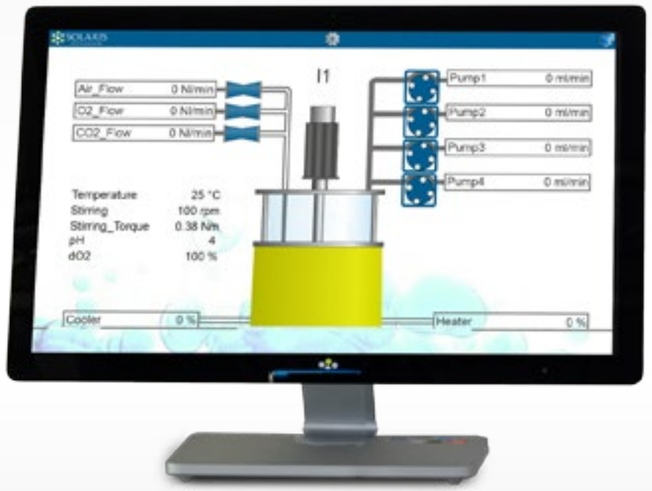
Benefits

Up to 24 units managed with one HMI with innovative **PARALLEL process control**
LEONARDO: smart controller designed to provide an high level of automated management of the fermentation/ cultivation processes

Batch, Fed batch
or continous processes

Different gas mixing strategies with up to 5 TMFC





23" (single unit) or
27" (multi system) **multi touch HMI**

Remote control via PC, tablet and smartphone for process management and after sale assistance

Powerful/ Accurate **brushless motor**, from 1 to 2000 RPM.
Online absorbed Torques (Nm) and Power (W) measurements obtaining an indirect density indication of the culture broth

Modbus Digital Hamilton sensors

LEDA safe sterile sampling system

Compact and modular PCS
(350x350x350 mm)

N.4 assignable Watson Marlow pumps,
all speed controlled in entry level

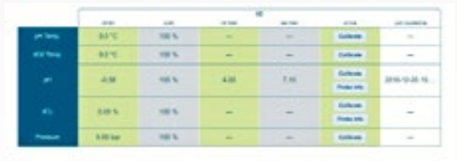
No water circulation
Thermoregulation performed through Peltier cell

Impressive
Thermoregulation Ramp

Modbus Hamilton sensors

Why a digital sensor?

Hamilton sensors (including Cell Density) has been integrated into Solaris PCS and Leonardo software giving the user the benefit of having a unique platform.
Fully compensated digital sensors, store and transmit all relevant sensor data, including calibration and diagnostic information directly to Solaris Leonardo software.



Sensor life traceability

Reducing background noise

pH

The electrolyte of the EasyFerm Bio sensors is prepressurized to prevent the diffusion of sample into the sensor. The Everef-F reference cartridge ensures that the reference electrolyte remains free of silver and precipitation of proteins.

dO2

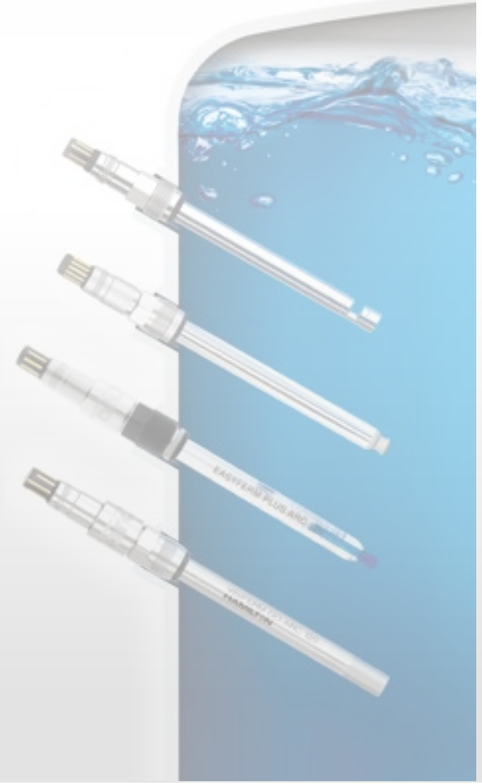
The VisiFerm DO is the first optical oxygen sensor with integrated opto-electronics. The visiFerm requires less maintenance than a classical oxygen sensor as it does not have a mechanically sensitive membrane or a corrosive electrolyte.

ORP

The ORP sensor through a pre-pressurized reference electrolyte has a clog-free diaphragm.
The sensor ensures a stable measurement signals after steam sterilization, autoclavation and CIP cleanings qith almost drift-free measurement.

Conductivity

All wetted conductivity sensor parts are FDA approved, can be cleaned easily and withstand CIP cleanings and autoclavations. The sensor shows a very good linearity over a broad measuring range.



Optical density sensor (total and viable cell density)

ON LINE MEASUREMENT OF TOTAL CELL DENSITY

- Simple online measurement of cell growth
- Reliable values during the growth phase
- Early detection of process deviations

The Dencytee sensor performs online measurement of total cell density in solution. The sensor is based on optical density, which measures the turbidity of the cell suspension. The measurement is made at NIR (near-infra red) wavelengths so it is insensitive to changes in media color. All particles and molecules that scatter light at 880 nm will be detected, including living and dead cells as well as cell debris. This measurement is effective after inoculation when cells are expanding quickly but concentrations are low, making capacitance-based readings less reliable.

ON LINE MEASUREMENT OF VIABLE CELL DENSITY

- Increase yield and lower production costs
- Detect changes in cell physiology with frequency scanning
- Precisely control harvesting for continuous culturing
- Early detection of process deviations

The Incyte sensor enables real-time, online measurement of viable cells in solution. The measurement is not influenced by changes in the media, microcarriers, dead cells or debris, and is designed for mammalian cell culture, yeast and high-density bacterial fermentation. Online measurement of viable cells makes it possible to detect events and respond in real time without sampling.

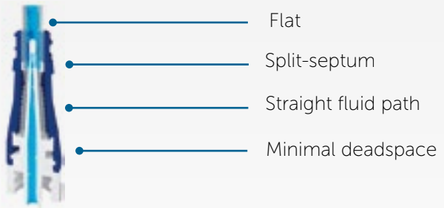
GAS MIXING

Various controller and hardware configurations enable aeration strategies using air, oxygen, nitrogen or a mixture of these to enrich the air. The mass-flow controller allows the exact flow rate control of individual gases. The flexible aeration options integrated in the bioreactor permit a wide range of different application giving to this system a substantial versatility.

- **Thermal Mass Flow Controller in entry model**
- **Gas mixing through TMFC+ solenoid valves or numbers of TMFC**
- **Automatic gas mixing algorithms**
- **Fluted sparger**

Leda sampling system

- **Sterile single use sampling system up to 180 sterile sampling per batch.**
- **Needlefree connector is designed to reduce the risk of contamination during sampling.**



Technical specifications	
Material	VALOX resin (external) silicone (internal)
Autoclavable	121-133°C (up to 30 minutes)
Residual volume	0.04 mL
Flow rate	165 mL/minute

The sterile combination of a syringe (3-5-10-30 ml) and a non return valve guarantee the sterility after sampling until the next use.

SOLARIS CUBE SERIES

Why a Cube?

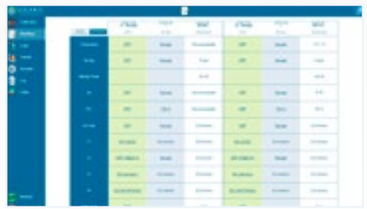
Solaris new modular product design strategy decreases time to market and the number of unique parts in the product architecture increasing the number of product variants. The result is a lean, flexible and smart PCS.

Additional parameter in modular external boxes for future PCS upgrade Including dCO_2, cell density, weight, peristaltic pumps, ect

Leonardo 2.0

USER-FRIENDLY SOFTWARE

The software is the user's best friend in experimental design planning and performing trial runs, as well as analyzing and optimizing media and parameters for cultivation. The graphical user interface enables you to select the software functions intuitively.
Data extracted are compatible with Windows Excel. However, Solaris has developed a platform where to easily and quickly manage fermentation data. This software is included in the fermenter supply and can be installed on unlimited number of client's PC or laptop.

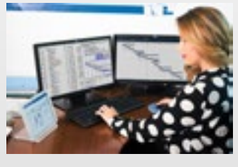


Parallel workflow

Parallel trends comparison between units, current and old batches

Do it parallel: smarter..faster

Leonardo can be used for process development (i.e. time-saving · parallel fermentation approaches) Up to 24 indipendent fermentations/cultivations can be carried out simultaneously.



Do it wireless!

Increased mobility: users can roam around lab or reaching office or home without losing their connection with the running batch.

Data sheet

Vessel		
Solaris Code	**IO 200**	**IO 1000**
Total Volume (ml)	200	1000
Ratio H/D	1:1,5	1:2,5
Min. Working Volume (ml)	120	320
Max. Working Volume (ml)	150	750
Max. temperature	70 °C	
Max Operating pressure	0,8 bar (g)	
Materials	Borosilicate glass and AISI 316 L	
Headplate Ports	n.3 DN12 ports(sensors, multifeed, condenser) n.3 DN8 ports(gas in sparger, harvest,sampling) n.2 DN9(gas out, level/antifoam,singlefeed)	n.5 DN12 ports(sensors, multifeed, condenser) n.3 DN8 ports(gas in sparger, harvest,sampling) n.2 DN9(gas out, level/antifoam,singlefeed)
Sensors lenght (mm)		
lenght	120	225
Dimensions for autoclave (with condenser)		
Height (mm)	280	380
Diameter (mm)	170	150
Stirring		
Drive	Brushless Motor, 1-2000 rpm	
Power	100 W	
Impellers	Select from: Rushtons impellers, Marine Impellers, Pitched blade	
Thermoregulation		
Control	PID control - accuracy 0,1°C - Peltier Cell	
Gas Control & Gas Mixing		
Sparger and overlay Gas Control	TMFC	
Gas Mixing (Air,CO_2,O_2,N_2)	1TMFC (included in entry level) +4 solenoid valves or + n. of additional TMFC	
Sparger type	Fluted with laser microholes provided with 0,2 µm filter	
Exhaust	0,2 µm filter	
Peristaltic Pumps		
up to 4 Watson Marlow 114, speed 0 - 60 rpm, volumetric flow 0,5-51 ml/min, application assignable from software		
Controller		
PCS	from 1 to 24 units - H: 350mm L: 350mm D: 350mm	
HMI with Leonardo software	23" for single units, 27" for multi systems (parallel)	

Controls

INTEGRATED IN S CUBE

pH	
Sensor	Digital Hamilton sensor
Sensitivity	57 to 59 mV/pH
Control system	Measuring resident in Leonardo 2.0 software
Control range	0 - 14
Operation temperature	0 - 130°C

dO_2	
Sensor	Digital Optical Hamilton sensor
Accuracy	±0.05%-vol, 21±0.2%-vol, 50±0.5%-vol
Control system	Measuring resident in Leonardo 2.0 software
Control range	0,05 - 300% air saturation
Operation temperature	-10 - 130°C

Redox (ORP)	
Sensor	Digital Hamilton sensor
Sensitivity	57 to 59 mV/pH
Control system	Measuring resident in Leonardo 2.0 software
Operation temperature	- 10 -130°C
Pressure range	≤ 6 bar

Antifoam/Level	
Sensor	Solaris sensor
Control	Measuring resident in Leonardo 2.0 software

Conductivity	
Sensor	Digital Hamilton sensor
Accuracy	±3% at 1 µS/cm to 100 mS/cm, ± 5% at 100 to 300 mS/cm
Control system	Measuring resident in Leonardo 2.0 software
Operation temperature	0 -130°C

MODULAR EXTERNAL BOX

dCO_2	
Sensor	Mettler Toledo sensor
Accuracy	±10% (pCO2 10-900 mbar) ≥ ± 10%
Control system	Measuring resident in Leonardo 2.0 software
Operation temperature	-20.0-150°C

Cell density	
Sensor	Hamilton-Fogale sensor
Accuracy	Mammalian cells in suspension ± 5·10⁴ cells/ml - Fermentation ± 0.05 g/l dry weight
Control system	Measuring resident in Leonardo 2.0 software
Option 1	Total cell density based on turbidity (10^5 to 10^8 mammalian cells/ml- 0.5 to 100 g/L dry weight)
Option 2	Viable cell density based on capacitance (5x10^5to 8x10^8 mammalian cells/ml-5 to 200 g/L dry weight)

Weight	
Sensor	load cells
Accuracy	±0.2g
Control	Measuring resident in Leonardo 2.0 software

Peristaltic pumps	
WM 313 FDM/D	175 rpm

UP TO 8
FERMENTERS
CONNECTED!

SOLARIS
BIOTECH SOLUTIONS

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