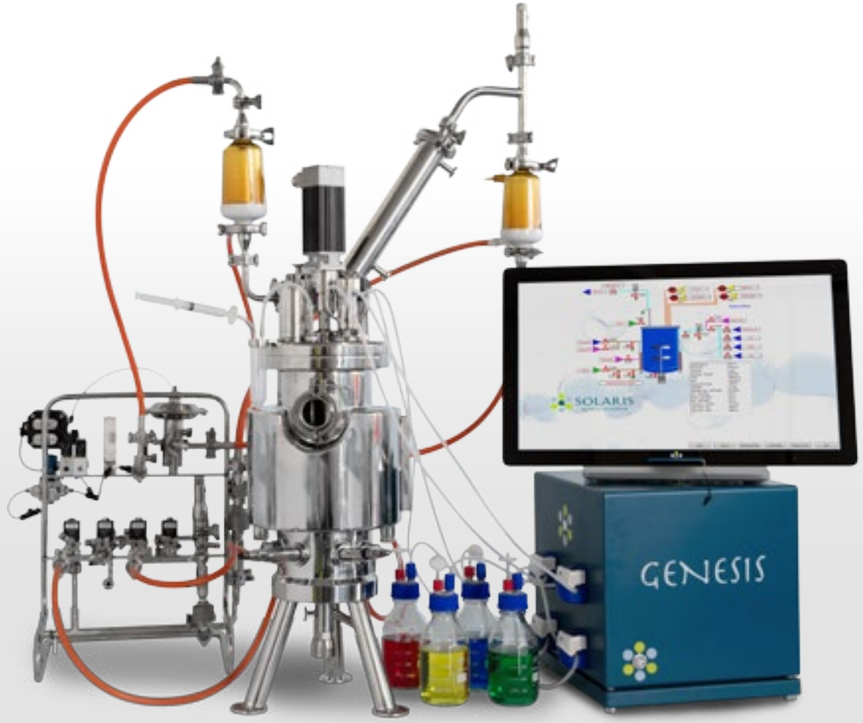
GENESIS

STANDARD STERILIZABLE IN PLACE SOLUTIONS

SOLARIS
BIOTECH SOLUTIONS

STANDARD STERILIZABLE IN PLACE SOLUTIONS

GENESIS is R&D Sterizable-In-Place Benchtop Fermenter/Bioreactor available from 7,5 up to 20 litres total volume.
Automatic sterilization by steam or alternative through electric heaters (steam source not necessary) .



GENESIS is an ideal partner for microbial fermentation as well as animal, plant and insect cell cultivation.
Typical applications includes the following:

Education
Basic research
Scale-up and scale-down studies
Process development and optimization

GENESIS can be used for:
Biopharmaceutical
Biofuels research and manufacturing
Vaccines
Food and beverage biotechnologies
Bioremediation
Bioplastics
Cosmeceutical
Nutraceutical

WHY TO INVEST
IN THIS PRODUCT

The best ratio
Quality/ Capability/Price
on the market

Automatic sterilization
through electrical heaters (no need for an external steam source) or by steam

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GENESIS

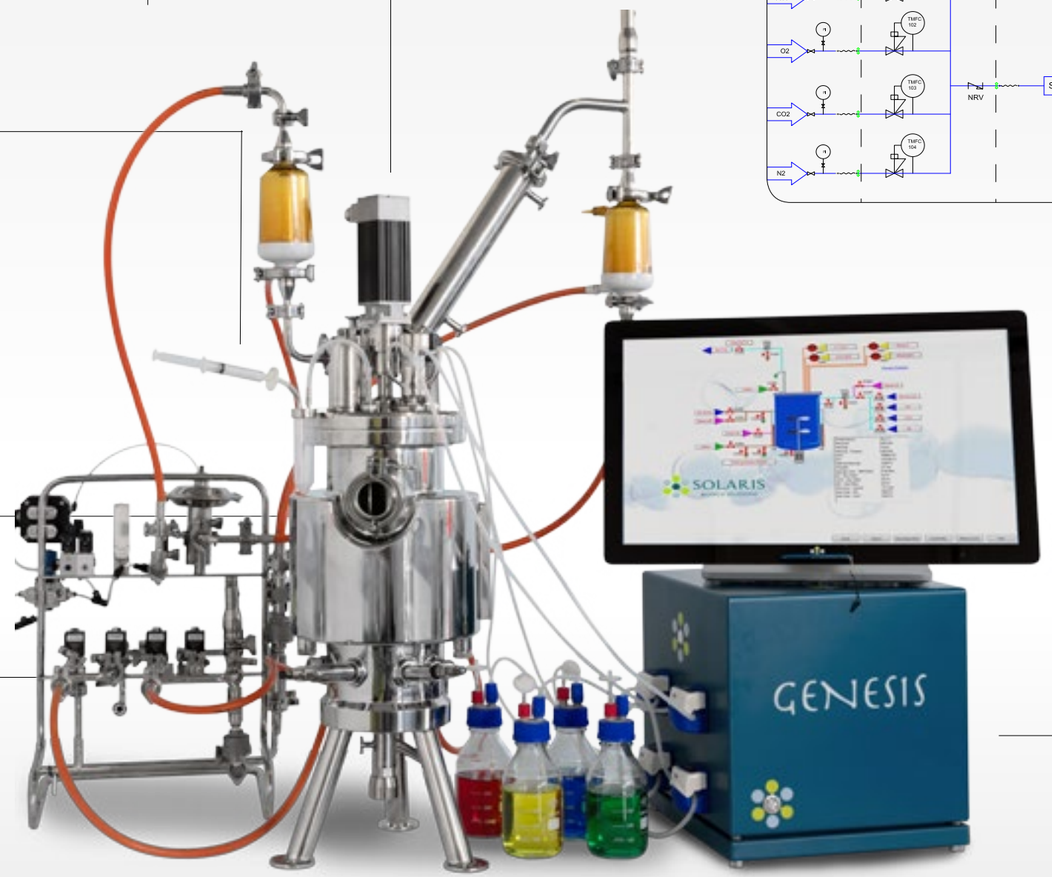
Benefits

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.

Sampling system

Illuminated side glass

Modbus Digital Hamilton sensors



Different gas mixing strategies with up to 5 TMFC

External additional boxes parameters for future PCS upgrade including dCO_2, Cell Density, Weight, Peristaltic pumps, ect

SBC16: smart controller designed to provide an high level of automated management of the fermentation/ cultivation processes
Batch, Fed batch or continous processes

Compact and modular PCS (350x350x350 mm)

Double jacket (side-bottom)
Increased heat transfer efficiency
It ensures optimal temperature control and sterilization even at

Harvest valve in entry level optionally SIP

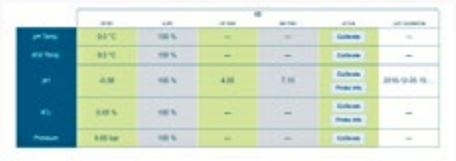
Automatic sterilization by steam or alternative through electric heaters

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

Modbus Hamilton sensors

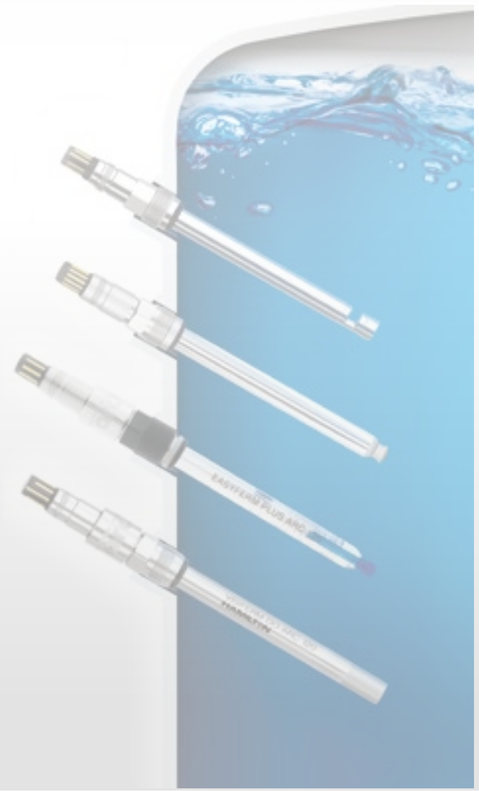
Why a digital sensor?

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.

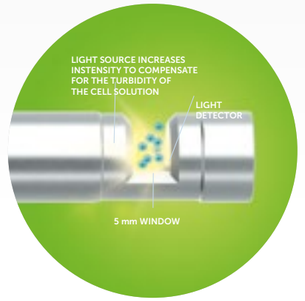
ON LINE MEASUREMENT OF TOTAL CELL DENSITY

- 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.

HOW IT WORKS

The Dencytee sensor emits light through a 5 mm window onto a light detector. Cells in suspension absorb and scatter light so less light is read by the detector. To compensate,
the sensor increases the amount of light emitted by the light source to maintain a constant reading at the detector. By reading the amount of light that is increased at the light source,
the Dencytee sensor can measure solutions with high cell densities.



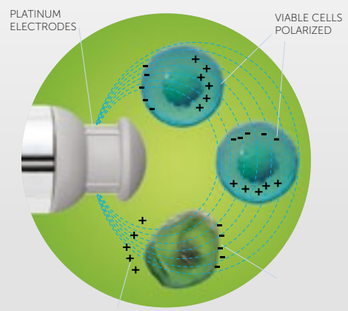
ON LINE MEASUREMENT OF VIABLE CELL DENSITY

- 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.

HOW IT WORKS

The Incyte measurement principle is based on capacitance. In an alternating electrical field, viable cells behave like small capacitors. The charge from these small capacitors is measured by the sensor and reported as permittivity (capacitance per area).



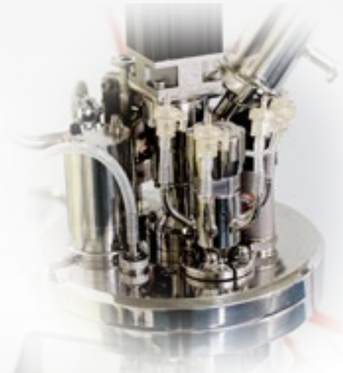
SALAS - Solaris Sterile Needle Free Additions System

NEEDLE FREE

EASY & QUICK OPERATION

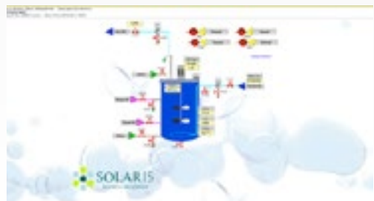
Genesis is supplied with **SALAS**, a 4 channels needle free additions system (Inoculums/ Feedings/pH corrective solutions/A.F solution).

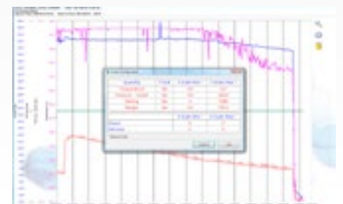
SALAS allows an easy and quick connection between the feeding solution and the vessel top lid.



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.





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 and solenoid valves or numbers of TMFC**
- **Automatic gas mixing**
- **Toro and sintered spargers**

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GENESIS

Data sheet

Vessel

Solaris Code	Genesis 7.5	Genesis 10.0	Genesis 15.0	Genesis 20.0
Total Volume (liters)	7.5	10.0	15.0	20.0
Ratio D/H	1:2,5	1:2,5	1:2,5	1:2,5
Min. Working Volume (liters)	1.3	1.8	2.7	3.6
Max. Working Volume (liters)	5.6	7.5	11.25	15
Working temperature range	0-135°C			
Working pressure range	2 bar			
Design	Stainless Steel Jacketed Vessel			
Materials	Parts in contact with the culture AISI 316 L - other parts AISI 304			
Finishing	All parts in contact with the culture: Ra < 0,5 µm ; External: Ra < 0,6 µm Mirror polished			

Ports and Connections

	Connection	Description
Vessel lid	PG13	Antifoam
	TC 3/4''	Safety valve
	TC 3/4''	Gas-out
	TK 3/4''	SALAS-Solaris Sterile liquid addition
	TC 1''	Pressure probe
	DN 52	Stirrer
Upper side wall	TC 1/2''	Overlay gas inlet
	TC 1/2''	Sparger
	In gold	Sight glass
	In gold	Sight glass
Lower side wall	Hygenic socket	pH probe
	Hygenic socket	dO probe
	Hygenic socket	spare probe
	Hygenic socket	spare probe
	Temperature housing	PT100
Vessel bottom	TC 3/4''	Harvest/sampling valve
Jacket in-out	TC 1/2''	Steam in
	TC 1/2''	Water in
	TC 1/2''	Jacket out
	1/2'' G	Electric heaters
	1/2'' G	Electric heaters
	1/2'' G	Electric heaters

Stirring

Drive	Brushless Motor, Direct Assembly, 1-1500 rpm (bacterial), 1-500 (cell cultures)
Power	208W (7.5-10L) ; 622W (15-20L)
Impellers	Select from: Rushtons impellers , Marine Impellers, Pitched blade

Thermoregulation

Control	PID Control - Accuracy 0,1 °C
	Jacket steam and electric heaters / cooling source

Gas Control & Gas Mixing

Sparger and overlay Gas Control	TMFC
Gas Mixing (Air,CO_2,O_2,N_2)	n.1 TMFC + n.4 solenoid valves, n° of TMFC
Sparger type	Select from: Toro type (ring), syntered microbubbling both provided with 0,2 µm filter
Exhaust	Condenser and 0,2 µm filter

Controller

Master Control Module	Dimensions Height: 350 mm Largeness: 350 mm Depth: 350 mm
HMI with Leonardo software	23'' touchscreen

Controls

INTEGRATED IN S CUBE

Temperature

Sensor	PT100
Control system	Measuring resident in Leonardo 2.0 software
Control range	0 - 150°C

pH

Sensor	Digital Hamilton sensor
Control system	Measuring resident in Leonardo 2.0 software
Control range	0 - 14
Operation temperature	0 - 130°C
Pressure range	0 - 6 bar
Actuator	Cascade to peristaltic pumps for the addition of acid/base solutions or gas (CO_2)

dO_2

Sensor	Digital Optical Hamilton sensor
Control system	Measuring resident in Leonardo 2.0 software
Control range	0,05 - 300% air saturation
Operation temperature	-10 - 130°C
Pressure range	0 - 12 bar
Actuator	Cascade to RPM, Gas Control, feedings,ect

Antifoam/Level

Sensor	Solaris sensor

Redox (ORP)

Sensor	Digital Hamilton sensor
Control system	Measuring resident in Leonardo 2.0 software
Control range	±2000 mV
Operation temperature	- 10 -130°C
Pressure range	≤ 6 bar

Conductivity

Sensor	Digital Hamilton sensor
Control system	Measuring resident in Leonardo 2.0 software
Control range	1 - 3000 µS/cm
Operation temperature	0 -130°C
Pressure range	0 - 20 bar

EXTERNAL MODULAR BOX

dCO_2

Sensor	Mettler Toledo sensor
Control system	Measuring resident in Leonardo 2.0 software
Control range	0,00-200% saturation
Operation temperature	-20.0-150°C
Pressure range	0 - 4 bar

Cell density

Sensor	Hamilton-Fogale sensor
Control system	Measuring resident in Leonardo 2.0 software
Pressure range	0-3 bar (option 1) 0-10 bar (option 2)
Operation temperature	0-60°C (option 1) 0-80°C (option 2) (max. sterilization temperature 135°C)
Option 1	Total cell density based on turbidity (Two ranges: 10^5 to 10^8 mammalian cells/ml - 0.5 to 100 g/L dry weight)
Option 2	Viable cell density based on capacitance (Two ranges: 5x10^5 to 8x10^8 mammalian cells/ml - 5 to 200 g/L dry weight)

Weight

Sensor	load cells
Control	Measuring resident in Leonardo 2.0 software

Peristaltic pumps

WM 114	10-60 rpm
WM 313 FDM/D	45-350 rpm

Chiller

- Optionally GENESIS can be equipped with a chiller for heat removal from your culture minimizing lab water usage
- Using this system you don't need a water supply line in your lab
- Cost-effective cooling of fermenters
- Easy operation
- Refregerant level monitoring

Chiller data sheet

Working temperature range	-10°C / +40°C
Temperature stability	±0.5
Power consumption	0.7 kW
Filling volume range	2-8 L
Cooling output at 20°C measured with ethanol	0.25-0.60 kW
Cooling output at 10°C measured with ethanol	0.20-0.50 kW
Cooling output at 0°C measured with ethanol	0.15-0.36 kW
Cooling output at -10°C measured with ethanol	0.09-0.15 kW
Pump pressure max.	0.35-1.30 bar
Pump flow max.	16-35 L/min.

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