GENESIS
SINGLE & PARALLEL MINI FERMENTER BIOREACTOR

SOLARIS
BIOTECH SOLUTIONS

GENESIS

This technical proposal describes a Solaris GENESIS.
For supervisory control and data acquisition Leonardo 3.0 is included.
The system consists of fermenter/bioreactor (total volume), bench-top, pre-assembled unit, supplied with all necessary tubes, valves and instruments, automation, control panel (HMI).
The system is designed for aerobic and anaerobic cultivations/ fermentations, closed aseptic operations.
The control is based on a SCADA control system.

Modular Platform

benchtop or wheeled skid options

Applications

Process development and optimization

Education

Basic Research

Scale up and scale-down studies

Small production

- Sterilization with steam, electrical heaters or hybrid (steam/electrical)

- Double jacket (side-bottom) for greater heat transfer efficiency and optimal temperature control

- AISI 316L vessel

- Microbial (Toro sparger, Rushton impellers, baffles) and cell cultures (Sintered sparger, Marine impellers, baffles caps) configurations available

- Wide range of measurement and control options

- Modbus digital sensors reduce background noise and guarantee quick response time

- Suitable for batch, fed-batch and continuous processes
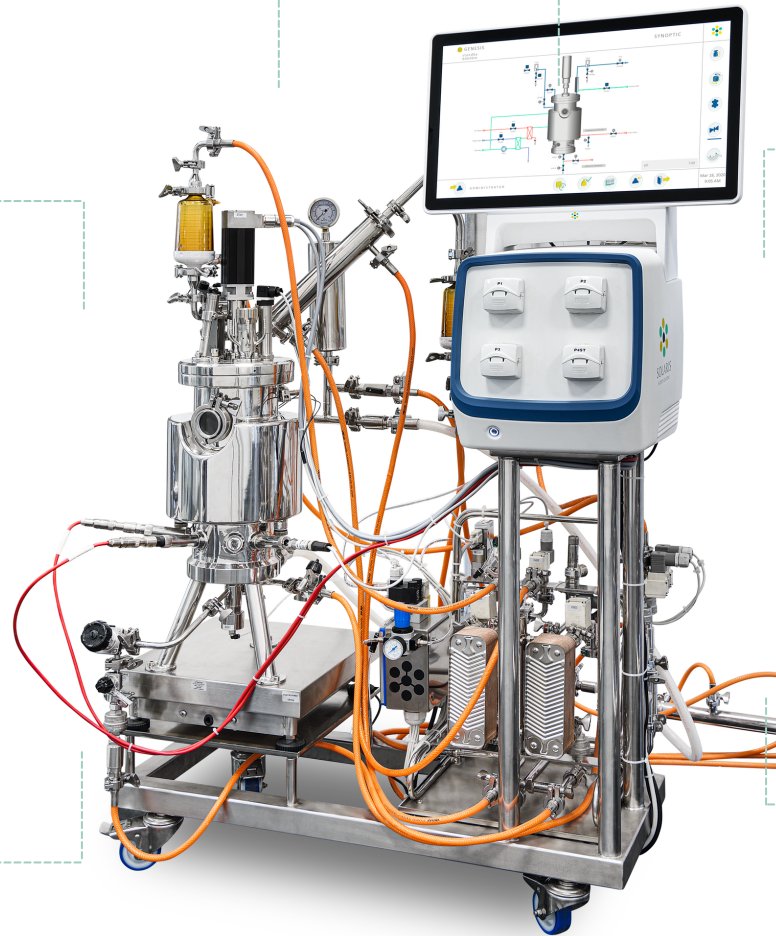
- Different gas mixing strategies with up to 5 TMFC and/or solenoid valves

- Powerful and accurate (1 RPM) brushless motor

- Optional integration of up to 4 analog input/output connections, choosing between 0-10 V and 0-20 mA/4-20 mA (e.g. pumps or valves with power supply independent from Solaris electrical cabinet)

- Wheeled skid option available

- The thermoregulation and aeration loops are external from the PCS, on a dedicated support with a combination of stainless-steel and flexible tubing

- Illuminated sight glass on the vessel lid, and circular sight glass on vessel side

Leonardo

- Innovative SCADA software LEONARDO: a smart and user-friendly controller designed to provide a high level of automated management of the fermentation/cultivation processes

- Full version included in the equipment supply

- Up to 24 units managed in parallel with a unique HMI (24")

- Data extraction in .csv format

- Remote access via PC, tablet or smartphone, with QR code scanning or dedicated portal
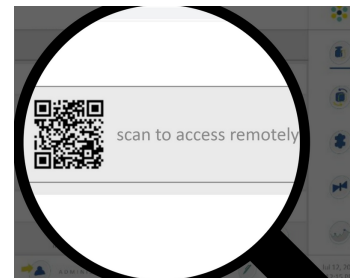
- Remote control
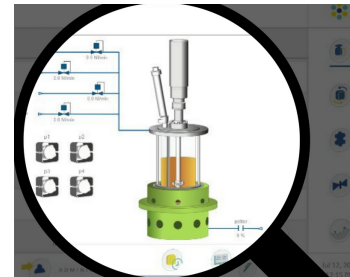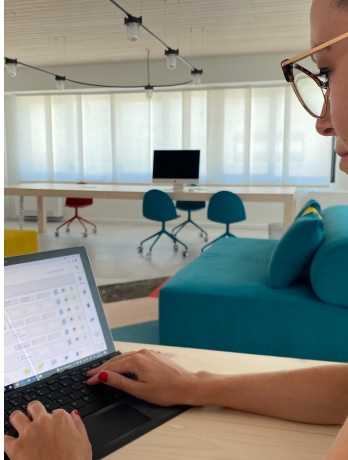
Synoptic
- real time 3D view
- parallel control
- manual control
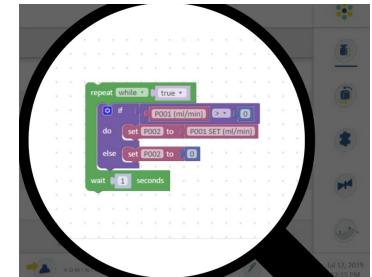
Logic Parser
- customized logic functions
- parallel logic blocks and funtions

Remote Control
- unlimited number of profiles editor
- unlimited number of devices to be associated
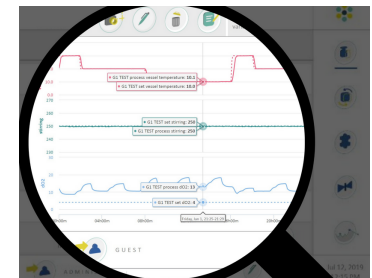
Trends
- custom acquisition time
- up to 6 values simultaneously display
- automatic graph comparison
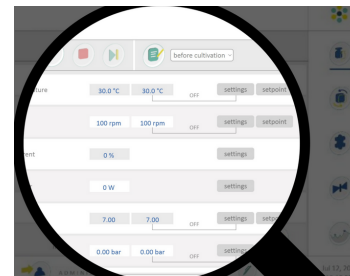
Workflow
- custom phase manager
- parallel visualization
- cascade settings
- peristaltic pumps function assignable from software

Calibration
- up to three-point calibration
- simoultaneus calibration values for parallel work

Vessel

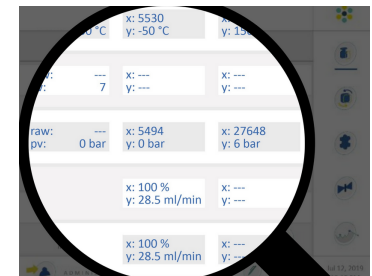| Solaris Code	Genesis 7.5	Genesis 10.0	Genesis 15.0	Genesis 20.0
Total Volume (liters)	7.5	10.0	15.0	20.0
Ratio D/H	1:2,5	1:2,5	1:2,5	1:2,5
Min. Working Volume (L)	1.3	1.8	2.7	3.6
Max. Working Volume (L)	5.6	7.5	11.25	15
Max. temperature	0-135 °C			
Operating pressure	2 bar			
Design	Stainless Steel 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)
Speed (rpm)	208W (7.5-10L) ; 622W (15-20L)
Impellers	Select from: Rushtons impellers, Marine impellers, Pitched blade

Thermoregulation

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

Gas Control & Gas Mixing

Sparger and overlay Gas Control	TMFC
Gas Mixing (Air, CO₂, O₂,N₂)	n.1 TMFC + n.4 solenoid valves, n° of TMFC
Sparger type	Select from: Toro type (ring), sintered microbubbling both provided with 0,2 μm filter
Gas Out	Condenser and 0,2 μm filter

Controller

Master Control Module	From 1 to 24 units - 35x37xh36 cm
HMI with Leonardo software	Operate interface 58x15xh48 cm with 24" monitor

Temperature

Sensor	PT100
Control system	Measuring resident in Leonardo 3.2 software
Control range	0 - 150 °C

pH

Sensor	Digital sensor
Control system	Measuring resident in Leonardo 3.2 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 (CO₂)

dO₂

Sensor	Digital Optical sensor
Control system	Measuring resident in Leonardo 3.2 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
Control	Measuring resident in Leonardo 3.2 software

Redox (ORP)

Sensor	Digital sensor
Control system	Measuring resident in Leonardo 3.2 software
Control range	± 2000 mV
Operation temperature	-10 - 130 °C
Pressure range	≤ 6 bar

Conductivity

Sensor	Digital sensor
Control system	Measuring resident in Leonardo 3.2 software
Control range	1 - 3000 μS/cm
Operation temperature	0 - 130 °C
Pressure range	0 - 20 bar

dCO₂

Sensor	Analog sensor
Control system	Measuring resident in Leonardo 3.2 software
Control range	0,00-200% saturation
Operation temperature	-20.0-150 °C
Pressure range	0 - 4 bar

Cell density

Sensor	Digital sensor
Control system	Measuring resident in Leonardo 3.2 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	Dencytee: 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	Incyte: 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	Digital balance
Control	Measuring resident in Leonardo 3.2 software

Peristaltic Pumps

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