

GENESIS

PILOT
SIP
FERMENTER
BIOREACTOR



SOLARIS
BIOTECH SOLUTIONS



GENESIS

This technical proposal describes a Solaris GENESIS. For supervisory control and data acquisition Leonardo 3.2 is included.

The system consists of SIP 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



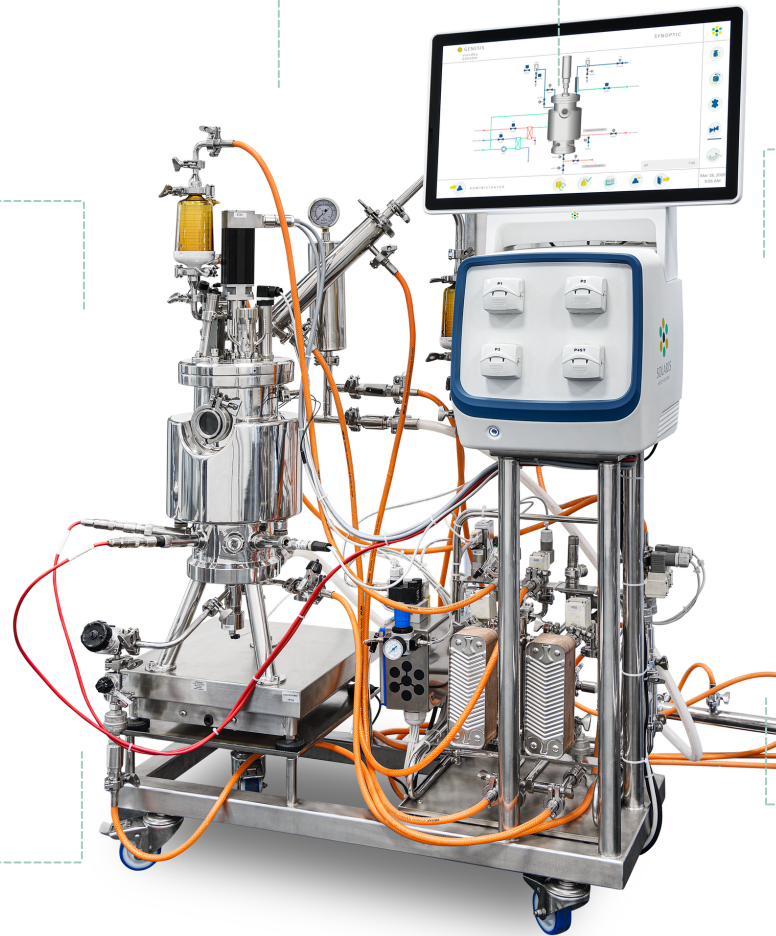
Small production

- 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

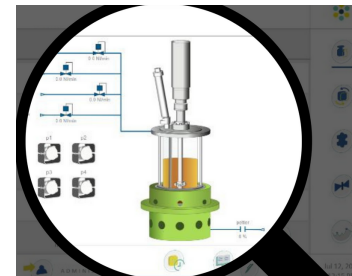
- Optional integration of up to 4 analog input/output connections, choosing between 0-10 V and 0-20 mA/4-20 mA (e.g. pumps or valves with power supply independent from Solaris electrical cabinet)
- Wheeled skid option available



- 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

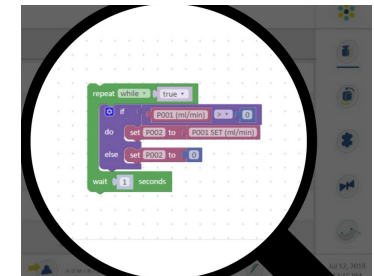
Leonardo

- 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



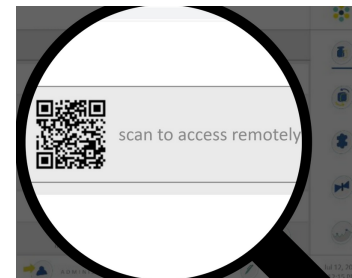
Synoptic

- real time 3D view
- parallel control
- manual control



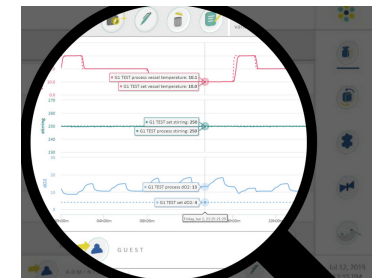
Logic Parser

- customized logic functions
- parallel logic blocks and funtions



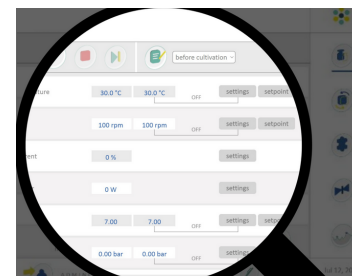
Remote Control

- unlimited number of profiles editor
- unlimited number of devices to be associated



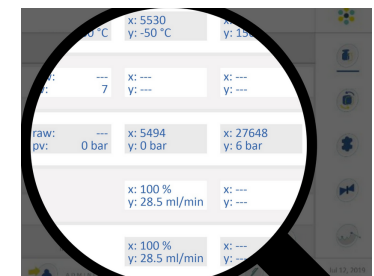
Trends

- 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
- simultaneous calibration values for parallel work

Vessel	Solaris Code	Genesis 7.5	Genesis 10.0	Genesis 15.0	Genesis 19.9
Total Volume (liters)		7.5	10.0	15.0	19.9
Ratio D/H		1:2,5	1:2,5	1:2,5	1:2,5
Min. Working Volume (L)		1.8	2.5	3.7	4.9
Max. Working Volume (L)		5.6	7.5	11.25	15
Max. temperature		0-135 °C			
Operating pressure		2 bar(g)			
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 < 0,4 µm ; External: Ra < 0,6 µm MIRROR polished			

Ports and Connections	Connection
Vessel lid	n.10: A.F., level probe, safety valve + gas out, SALAS, stirrer, sparger, pressure probe, 2xremovable baffles, sight glass + lamp
Upper side wall	n.2: overlay gas inlet, circular sight glass
Lower side wall	n.6: 2xhygenic socket pH and dO ₂ , 2xspare probes, sampling valve, sensor PT100
Vessel bottom	n.1: harvest valve
Jacket in-out	n.8: steam in, steam out, water in, jacket in/out, 3x electrical heaters in, PT100 for jacket

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 - 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), 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 - 35x35x35 cm
HMI with Leonardo software	Operate interface: touch screen PC, 24" color monitor, power consumption 200W

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 (CO ₂)

dO₂	
Sensor	Digital Optical sensor
Control system	Measuring resident in Leonardo 3.2 software
Control range	0 - 300% air saturation
Operation temperature	up to 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	up to 130 °C
Pressure range	0 - 6 bar

Conductivity	
Sensor	Digital sensor
Control system	Measuring resident in Leonardo 3.2 software
Control range	1 - 300.000 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 -200% saturation
Operation temperature	0 - 130 °C
Pressure range	0 - 4 bar

Cell density	
Sensor	Digital sensor
Control system	Measuring resident in Leonardo 3.2 software
Operation temperature	0 - 90° up to 141°
Pressure range	up to 10 bar (150 psi)
Interfaces	RS485 Modbus
VCD Measuring Range	Capacitance: 0.0 to 400pF/cm

Weight	
Sensor	Digital balance
Control	Measuring resident in Leonardo 3.2 software

Peristaltic Pumps	
WM 120 U Brushless	1-100 rpm
WM 313 FDM/D	175 rpm
WM 313 OEM VBM-D	175 rpm