IO

SINGLE & PARALLEL
MINI
FERMENTER
BIOREACTOR

SOLARIS
BIOTECH SOLUTIONS

IO

This technical proposal describes a Solaris IO.
For supervisory control and data acquisition Leonardo 3.2 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.
IO is completely electrical. The thermoregulation (both heating and cooling) is performed through a Peltier Cell, placed on the bottom of the fermenter/bioreactor. This avoids water circulation (no water source is needed in the lab).
The control is based on a SCADA control system.

Multiple operations

up to 24 parallel units

Applications

Process development and optimization

Education

Basic Research

Scale up and scale-down studies

Small production

- Fully electric: no water circulation
- Up to 24 units managed with one HMI with innovative PARALLEL process control

- Single-wall borosilicate glass vessel, with thermoregulation performed through a Peltier Cell
- Different configurations available for microbial and cell culture applications, with the choice of Rushton/Marine/Pitched-Blade impellers and fluted/L-shaped sparger

- Modbus digital sensors reduce background noise and guarantee quick response time
- Suitable for batch, fed-batch and continuous processes

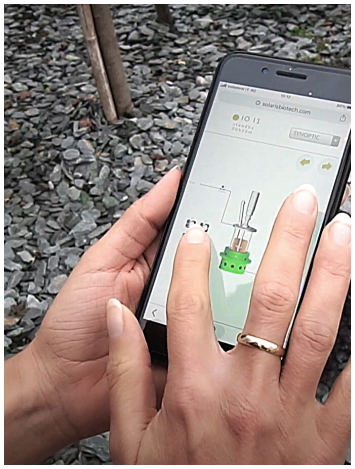
- Different gas mixing strategies with up to 5 TMFC and/or solenoid valves
- Powerful and accurate (1 RPM) brushless motor

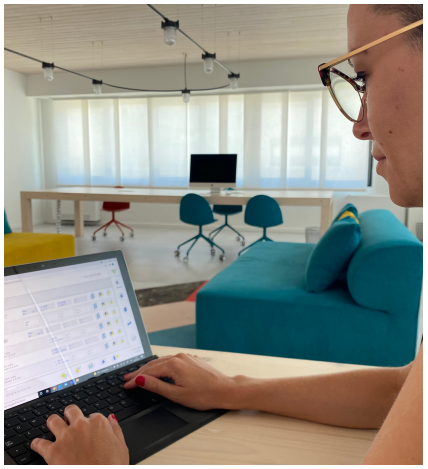
- Wide range of measurement and control options
- Optional integration of up to 4 analog input/output connections, choosing between 0-10 V and 0-20 mA/4-20 mA (e.g. pumps or valves with power supply independent from Solaris electrical cabinet)

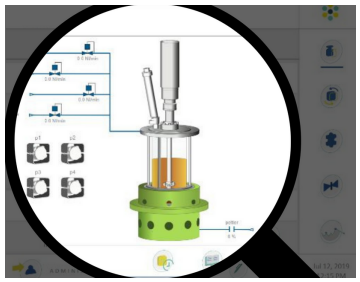
- Extremely compact system maximizes lab space
- Additional parameter in modular external boxes for future PCS upgrade Including dCO2, cell density, weight, peristaltic pumps

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

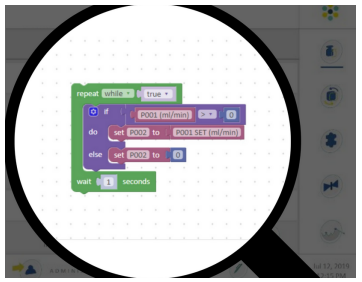






Synoptic

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

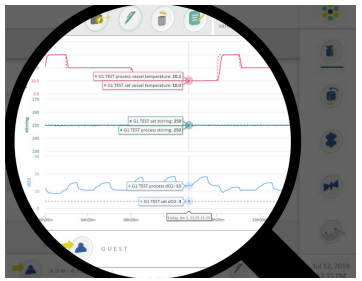


Logic Parser

- customized logic functions
- parallel logic blocks and funtions

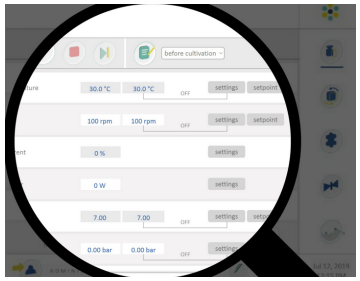
Remote Control

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



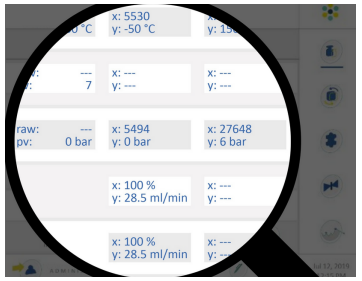
Trends

- 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	IO 200	IO 1000
Total Volume (ml)	200	1000
Ratio D/H	1:1,5	1;2,5
Min. Working Volume (L)	50	250
Max. Working Volume (L)	150	750
Max. temperature	65 °C	
Operating pressure	> 0.8 bar (g)	
Materials	Borosilicate Glass and AISI 316 L	
Headplate ports (n.10 in Jupiter 2.0; n.13 in the others)	IO 200: n.3 PG13.5 (sensors, gas out condenser, multifeed, plug), n.2 ports M11 (gas sparger, harvest/sampling, LEDA), n.3 M12 (gas out, antifoam probe, level proble, single feed, plug) IO 1000: n.5 PG13.5 (sensors, gas out condenser, multifeed, level probe), n.5 DN9 (gas in sparger, harvest, sampling, gas out, antifoam probe, single feed),	

Sensors length (mm)

lenght	120	225

Dimensions for autoclave (with Condenser)

Height (mm)	320	420
Diameter (mm)	170	170

Stirring

Drive	Brushless Motor, 1-2000 rpm
Impellers	Select from: Rushtons impellers, Marine impellers, Pitched blade

Thermoregulation

Control	PID Control - Accurancy 0,1 °C - Peltier Cell

Gas Control & Gas Mixing

Sparger and overlay Gas Control	TMFC
Gas Mixing (Air, CO_2, O_2,N_2)	n.1 TMFC (included in entry level) + n.4 solenoid valves or + n. of additional TMFC
Sparger type	Fluted with laser microholes provided with 0,2 µm filter
Gas Out	0,2 µm filter

Peristaltic Pumps

n.2 WM 400 F/A 35 rpm
n.2 WM 114 FD/DV 60 rpm
Function assignable from software

Controller

PCS	From 1 to 24 units - 35cm x 35xm x 35cm
HMI with Leonardo software	Touch screen PC, 24" color monitor; power consumption 200W

pH

Sensor	Digital sensor
Sensitivity	57 to 59 mV/pH
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)

dO_2

Sensor	Digital Optical sensor
Accuracy	1±0.05%-vol, 21±0.2%-vol, 50±0.5%-vol
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

Redox (ORP)

Sensor	Digital sensor
Measuring range	±1500 mV
Control system	Measuring resident in Leonardo 3.2 software
Operation temperature	up to 130 °C
Pressure range	0 - 6 bar

Antifoam/Level

Sensor	Solaris sensor
Control	Measuring resident in Leonardo 3.2 software

Conductivity

Sensor	Digital sensor
Accuracy	±3% at 1 µS/cm to 100 mS/cm, ±5% at 100 to 300 mS/cm,
Control system	Measuring resident in Leonardo 3.2 software
Operation temperature	up to 130 °C
Pressure range	0 - 20 bar
Control range	1 - 300.000 µS/cm

dCO_2

Sensor	Analog sensor
Accuracy	± (10% of the reading + 10 mbar)
Control system	Measuring resident in Leonardo 3.2 software-
Operation temperature	up to 130 °C
Pressure range	0-4 bar(g)
Control range	0 - 200% saturation

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
Accuracy	±0.1 g
Control	Measuring resident in Leonardo 3.2 software

Peristaltic Pumps

WM 120 U Brushless	1-100 rpm