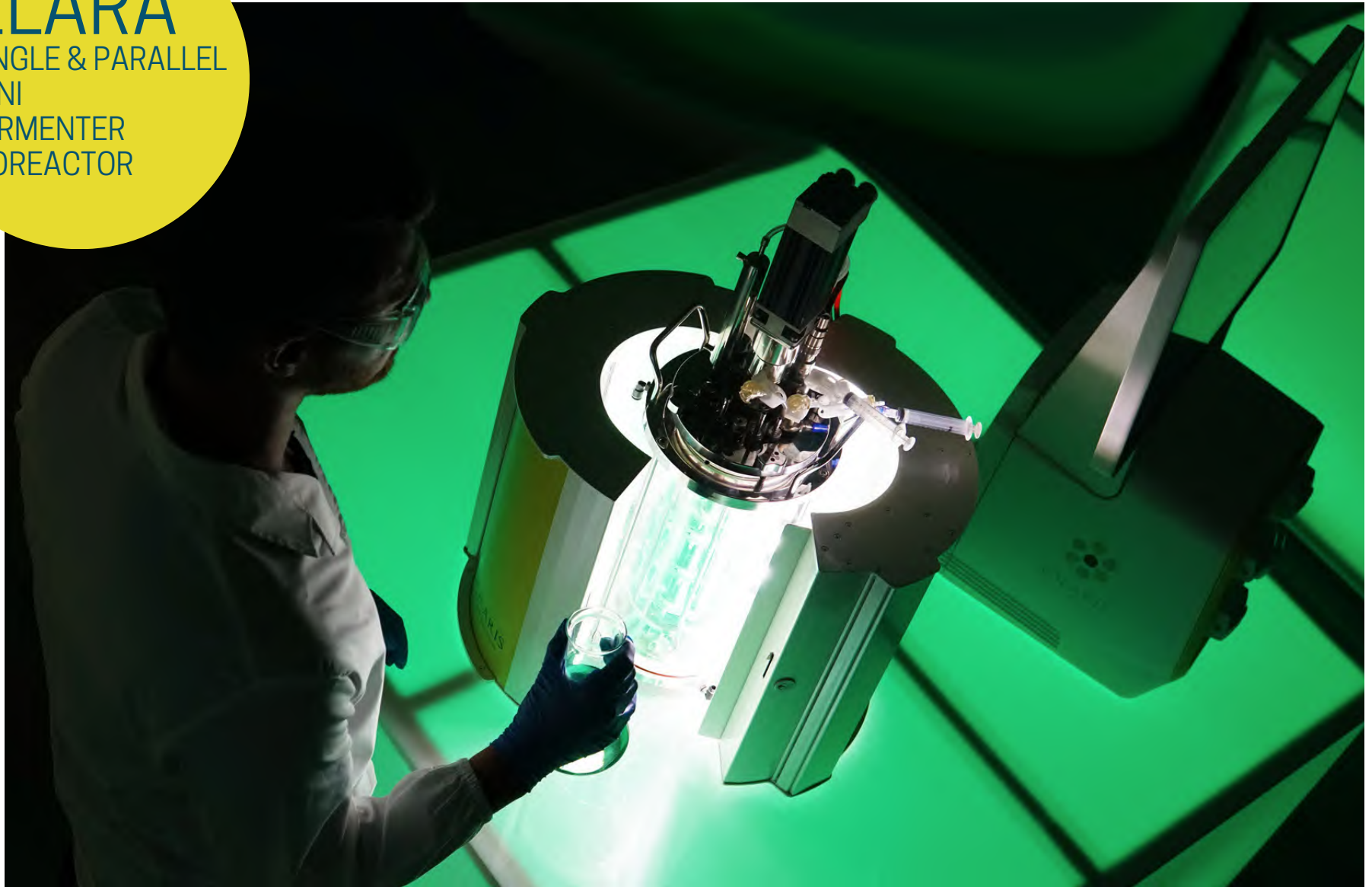


ELARA

SINGLE & PARALLEL
MINI
FERMENTER
BIOREACTOR





ELARA

The system consists of autoclavable photobioreactor, bench-top, pre-assembled unit, supplied with all necessary tubes, valves and instruments, automation, control panel (HMI).

The system is designed for cultivation of phototropic organisms including plant cells, bacteria, moss and microalgae.

The light intensity is dimmable from 0-100% up to $3000\mu\text{mol}(\text{photon})/\text{m}^2$.

The control is based on a SCADA control system. The system is equipped with n.4 peristaltic pumps, software configurable from controlpanel.

Different light modules

detachable wrap module or flat panel

Applications



Process development and optimization



Education



Basic Research



Scale up and scale-down studies



Small production

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

- Single-wall borosilicate glass vessel, with thermoregulation performed through a Peltier Cell
- Different configurations available, with the choice of Rushton/Marine/Pitched-Blade impellers, and Toro/Sintered sparger



- Gentle mix performed through airlift, which prevents damages to cell membrane and ensures an efficient homogenization.
- The light spectrum is selectable, and the light intensity is dimmable from 0-100% up to 3000 $\mu\text{mol}(\text{photon})/\text{m}^2$.



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

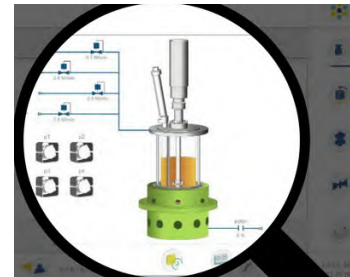
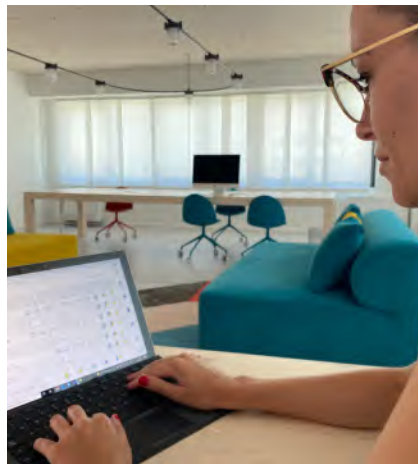
- Fully removable and cleanable glass jacket for improved heat transfer during autoclaving
- Wide range of measurement and control options
- Optional integration of up to 4 analog input/output connections, choosing between 0-10 V and 0-20 mA/4-20 mA (e.g. pumps or valves with power supply independent from Solaris electrical cabinet)



- Light module consisting of n.3 vertical bars with 6 white dynamic Leds each; Each LED consists of four chips: n.2 dedicated to warm white light (2700K) and n.2 for cool white light (6500 K)
- LED total power: 180W; LED brightness: 6120 lm.
- Automatic and manual control of light intensity and circadian cycle simulation

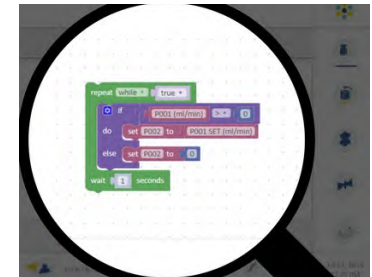
Leonardo

- 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 functions



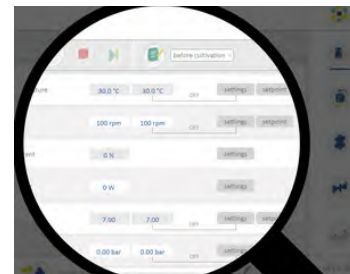
Remote Control

- 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

Photobioreactor type	Stirred	Flat
Total Volume (liters)	4,00	1,60
Ratio D/H	1:3,0	1:2,4
Min. Working Volume (L)	0,60	1,30
Max. Working Volume (L)	3,00	1,40
Max. temperature	135°C	50°C
Operating pressure	< 0,5 bar	< 0,5 bar
Ports	n.1 port Gas Sparger input n.1 port, Gas overlay n.1 port, Harvesting system n.1 port, Sampling system n.1 port, Temperature Sensor	n.1 port Gas out Condenser n.1 port, Antifoam probe n.1 port, multi addition (3) needle free connectors n.1 port, single addition needle free connector n.4 port, Hygienic Socket Solaris, Spare probes
	n.1 port, multi addition (4) needle free connectors n.5 ports, spares probes n.1 port, single addition needle free connector n.1 port, Agitation Group	n.1 port, temp. housing, PT100 n.2 ports, Sampling system n.1 port, Gas Sparger Input n.1 port, Baffle n.3 ports, Spares (1bottom,2short) n.1 port, Harvest valve
Design	Borosilicate Glass Jacketed Vessel	Borosilicate Glass Jacketed Vessel with Super Duplex and AISI 316
Materials	Borosilicate Glass and AISI 316 L	Borosilicate Glass, Super Duplex, AISI 316

Sensors length (mm)

pH	325	225
dO ₂	325	225

Dimensions for autoclave (with Condenser)

Height (mm)	625	660
Diameter (mm)	225	280

Stirring (for ELARA ST)

Drive	Brushless Motor, Direct Assembly, 1-2000 rpm (bacterial), 1-500 (cell cultures)
Power (Pn)	226 W
Impellers	Select from: Rushtons impellers, Marine impellers, Pitched blade

Thermoregulation

Control	PID Control - Accuracy 0,1 °C Thermobox (flat) / water jacketed with electric heaters (stirred vessel)
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Gas Control & Gas Mixing

Sparger and overlay Gas Control	TMFC	TMFC
Gas Mixing (Air, CO ₂ , O ₂ , N ₂)	n.1 TMFC + n. solenoid valves or n. TMFC	n.1 TMFC + n. solenoid valves or n° of TMFC
Aeration system	Toro type (ring), sintered microbubbling sparger with 0,2 µm filter	Micro holes Type with 0,2 µm filter
Exhaust	Condenser and 0,2 µm filter	Condenser and 0,2 µm filter

Peristaltic Pumps

Peristaltic pumps	n. 4 Watson Marlow 114, fixed speed or speed controlled, application assignable from software	n. 4 Watson Marlow 114, fixed speed, max 60 rpm, volumetric flow 0,5-51 ml/min, function assignable from software (optional) Watson Marlow type 113 FDM/D, max speed 350 rpm, volumetric flow 1,5-1750 ml/min, function assignable from software
Variable speed	10 - 60 rpm	

Controller

Master Control Module	From 1 to 24 units - 35x37x36 cm
HMI with Leonardo software	Operate interface 58x15x48 cm with 24" monitor

Temperature

Sensor	PT100
Control system	Measuring resident in Leonardo 3.0 software
Control range	0 - 150 °C

pH

Sensor	Digital hamilton sensor
Control system	Measuring resident in Leonardo 3.0 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)

dO₂

Sensor	Digital Optical Hamilton sensor
Accuracy	Measuring resident in Leonardo 3.0 software
Control system	0,05 - 300% air saturation
Control range	-10 - 130 °C
Operation temperature	0 - 12 bar
Pressure range	Cascade to RPM, Gas Control, feeding, ect

Antifoam/Level

Sensor	Solaris sensor
Control	Measuring resident in Leonardo 3.0 software

Redox (ORP)

Sensor	Digital Hamilton sensor
Control system	Measuring resident in Leonardo 3.0 software
Control range	± 2000 mV
Operation temperature	-10 - 130 °C
Pressure range (for ELARA FLAT)	≤ 6 bar

Conductivity

Sensor	Digital Hamilton sensor
Control system	Measuring resident in Leonardo 3.0 software
Control range	1 - 3000 µS/cm
Operation temperature	0 - 130 °C

dCO₂

Sensor	For ELARA ST: Mettler Toledo sensor , for ELARA FLAT: Analog sensor
Control system	Measuring resident in Leonardo 3.0 software
Control range	0,00-200% saturation
Operation temperature	-20,0-150 °C
Pressure range	0 - 4 bar

Weight

Sensor	For ELARA ST: load cells, for ELARA FLAT: Digital Balance
Control	Measuring resident in Leonardo 3.0 software

Peristaltic Pumps

WM 114	10-60 rpm
WM 313 FDM/D	For ELARA ST: 45-330 rpm, for ELARA FLAT: 45-350