



*Your right choice  
without compromises*





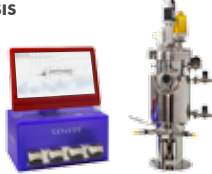







Solaris is worldwide acknowledged as a leading turnkey project executor and consultant for the process world. Our mission is to be for our customers a

partner of choice for bioprocess solutions concerning both equipment and processes with the capability of offering an integrated service, which is probably unique in this field.

Products Overview

BENCH TOP					
	JUPITER	JUPITER single use	ESEDRA	ELARA	GENESIS
					
TOTAL VOLUMES RANGE	2.0/3.0/4.0/4.5/5.0/5.5/6.0/7.0/8.0/10.0 L	250 ml - 28 liters	1.0 - 20.0 L	4.0 L	7.0/10.0/15.0/20.0 L
CONFIGURATION	STANDARD	CUSTOM	CUSTOM	STANDARD	STANDARD
STERILIZATION	AUTOCLAVABLE	PRE-STERILIZED - DISPOSABLE	AUTOCLAVABLE	AUTOCLAVABLE	STERILIZABLE IN PLACE
USE	BACTERIA/CELL CULTURES	BACTERIA/CELL CULTURES	BACTERIA/CELL CULTURES	BACTERIA/CELL CULTURES	BACTERIA/CELL CULTURES
	VESSEL				
DESIGN	BOROSILICATE GLASS JACKETED VESSEL	PC (POLYCARBORATE) PRE-STERILIZED VESSEL	BOROSILICATE GLASS JACKETED AND SINGLE WALL VESSEL	BOROSILICATE GLASS JACKETED VESSEL	STAINLESS STEEL JACKETED VESSEL
	CONTROLLER				
CONTROLLER	PLC	PLC	PLC	PLC	PLC
SOFTWARE	LEONARDO	LEONARDO	SBC-14	SBC-14	SBC-14
HMI	18,5" TOUCH SCREEN	18,5" TOUCH SCREEN	15" TOUCH SCREEN	15" TOUCH SCREEN	18,5" TOUCH SCREEN
CFR21 P.11	-	-	●	●	●
	AGITATION				
MOTOR TYPE	D.C BRUSHLESS	D.C BRUSHLESS	D.C BRUSHLESS	D.C BRUSHLESS	D.C BRUSHLESS
POSITIONING	TOP DIRECT ASSEMBLY	TOP DIRECT ASSEMBLY	TOP DIRECT ASSEMBLY	TOP DIRECT ASSEMBLY	TOP DIRECT ASSEMBLY
MECHANICAL SEAL	SINGLE	SINGLE	SINGLE	SINGLE	SINGLE
	GAS CONTROL				
MASS FLOW CONTROLLER	N.1 TMFC	N.1 TMFC	1 TMFC	1 TMFC	N.1 TMFC
GAS MIXING	1 TMFC + n.4 SOLENOID VALVES OR UP TO 5 TMFC	1 TMFC + n.4 SOLENOID VALVES OR UP TO 5 TMFC	1 TMFC + n.4 SOLENOID VALVES OR UP TO 5 TMFC	1 TMFC + n.4 SOLENOID VALVES OR UP TO 5 TMFC	1 TMFC + n.4 SOLENOID VALVES OR UP TO 5 TMFC
	THERMOSTATTING				
THERMOREGULATION SYSTEM	JACKET WATER HEATERS	JACKET WATER HEATERS OR HEATING BLANKET AND COOLING FINGER	JACKET WATER HEATERS OR HEATING BLANKET AND COOLING FINGER	JACKET WATER HEATERS	JACKET WATER HEATERS / STEAM-COOLING SOURCE
	pH CONTROL				
SENSOR	●	●	●	●	●
	dO <sub>2</sub> CONTROL				
SENSOR	●	●	●	●	●
	FOAM LEVEL				
SENSOR	●	●	●	●	●
	PERISTALTIC PUMPS				
PERISTALTIC PUMPS	4	4	UP TO 6	UP TO 6	4
	TURBIDITY				
TURBIDITY CONTROL			●	●	●
	WEIGHT				
WEIGHT CONTROL			●	●	●
	REDOX				
REDOX			●	●	●
	CO <sub>2</sub>				
CO <sub>2</sub>			●	●	●
	CONDUCTIVITY				
CONDUCTIVITY			●	●	●

	PILOT SCALE		INDUSTRIAL SCALE
	M SERIES	S SERIES	I SERIES
			
TOTAL VOLUMES RANGE	30/50/75/100/150/200 L	5.0 - 200 L	250 L - 30 m3
CONFIGURATION	STANDARD	CUSTOM	CUSTOM
STERILIZATION	STERILIZABLE IN PLACE	STERILIZABLE IN PLACE	STERILIZABLE IN PLACE
USE	BACTERIA/CELL CULTURES	BACTERIA/CELL CULTURES	BACTERIA/CELL CULTURES
	VESSEL		
DESIGN	STAINLESS STEEL JACKETED VESSEL	STAINLESS STEEL JACKETED VESSEL	STAINLESS STEEL JACKETED VESSEL
	CONTROLLER		
CONTROLLER	PLC	PLC	PLC
SOFTWARE	SBC-14	SBC-14	SBC-14
HMI	15" TOUCH SCREEN	17" TOUCH SCREEN	17"/19" TOUCH SCREEN
CFR21 P.11	●	●	●
	AGITATION		
MOTOR TYPE	A.C BRUSHLESS	A.C BRUSHLESS	A.C BRUSHLESS
POSITIONING	BOTTOM	TOP/BOTTOM DIRECT OR MAGNETIC	TOP/BOTTOM DIRECT OR MAGNETIC
MECHANICAL SEAL	SINGLE	SINGLE/DOUBLE	SINGLE/DOUBLE
	GAS CONTROL		
MASS FLOW CONTROLLER	N.1 TMFC	N.1 TMFC	1 TMFC
GAS MIXING	UP TO 5 TMFC	UP TO 5 TMFC	UP TO 5 TMFC
	THERMOSTATTING		
THERMOREGULATION SYSTEM	JACKET WATER HEATERS / STEAM-COOLING SOURCE	STEAM/COOLING SOURCE	STEAM/COOLING SOURCE
	pH CONTROL		
SENSOR	●	●	●
	dO <sub>2</sub> CONTROL		
SENSOR	●	●	●
	FOAM LEVEL		
SENSOR	●	●	●
	PERISTALTIC PUMPS		
PERISTALTIC PUMPS	4	ACCORDING URS	ACCORDING URS
	TURBIDITY		
TURBIDITY CONTROL	●	●	●
	WEIGHT		
WEIGHT CONTROL	●	●	●
	REDOX		
REDOX	●	●	●
	CO <sub>2</sub>		
CO <sub>2</sub>	●	●	●
	CONDUCTIVITY		
CONDUCTIVITY	●	●	●





Autoclavable, Single-Use & SIP Fermenters/Bioreactors

Benchtop Bioreactors - Fermenters of Solaris represent the ideal solution for all necessities in the field of research, teaching and little scale production due to their flexibility and simplicity in use. The flexibility is guaranteed by a broad

range of alternatives which give the client the opportunity of a real customization according to his needs and requirements. Autoclavable, single-use or in situ sterilisable, with mechanic or magnetic agitation, electric thermostating or hot water recirculation

loop, for bacteria or cell cultures, batch or continuous, different automatization and process control grade, wide possibility of sensors installation.



# JUPITER

Next generation of Autoclavable R&D bioreactors/fermenters: NOW

JUPITER has shocked the market of R&D fermenters/bioreactors with a pre-packed high tech innovative solution, ready out of the box at a terrific price.



# Many good reasons to invest in JUPITER



9. Compact master control station:  
h. 23 cm - l. 45 cm - d. 35 cm

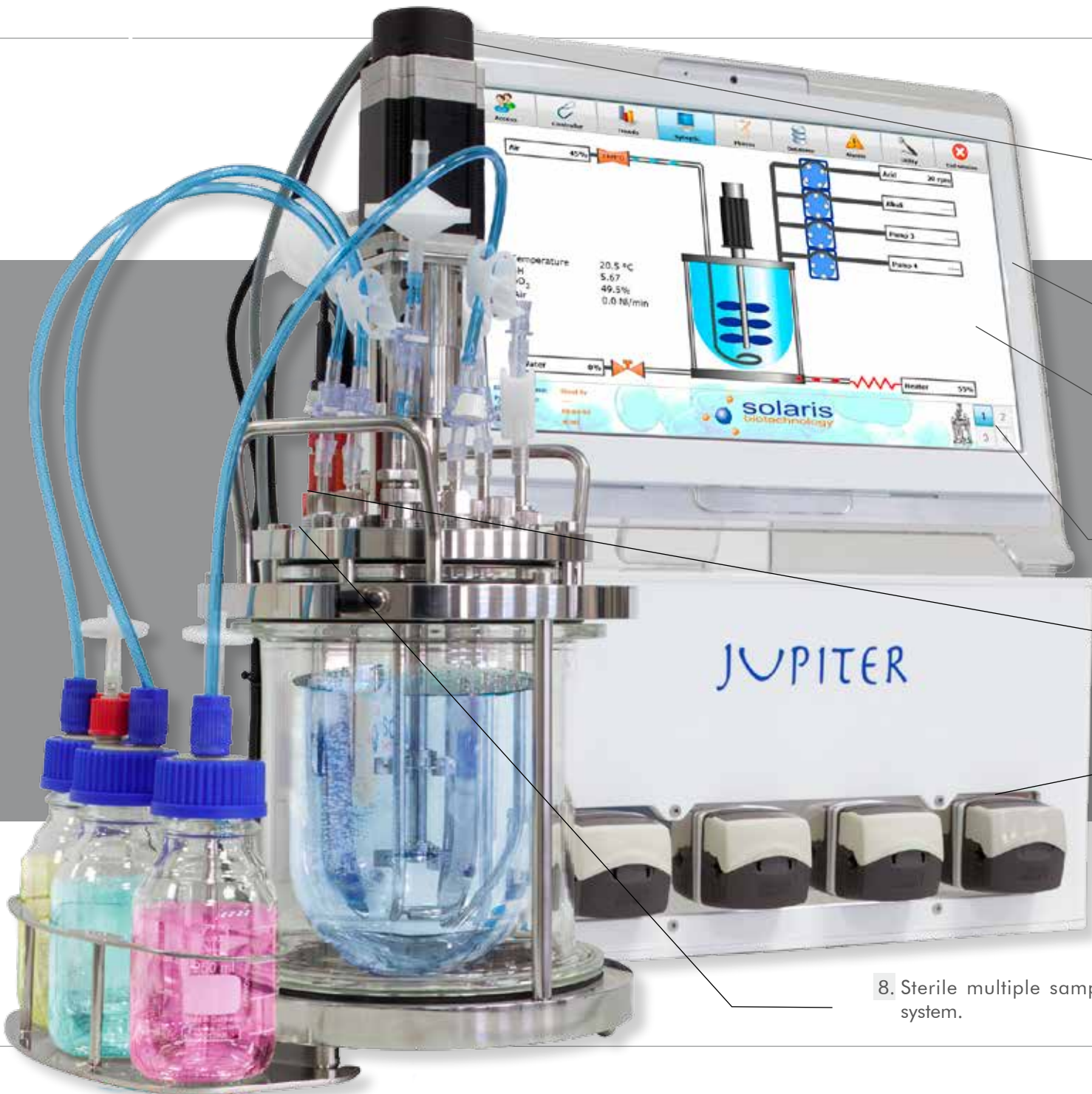
Universal power supply 100-240 V.  
Rear module with 3 removable  
technical trays (power, control,  
process) to facilitate the after sales  
service.



10.Safety: pressure relief  
valve included with  
every unit



11.Fully removable and  
cleanable jacket



1. n.1 TMFC in the entry model.  
Gas mixing: up to 5 TMFC (Air, CO<sub>2</sub>, N<sub>2</sub>, O<sub>2</sub>  
and Overlay).

2. Brushless motors,  
from 1 to 2000 RPM.

3. 18.5" touch display

4. LEONARDO: smart controller designed to  
provide an high level of automated  
management of the fermentation processes.  
Remote Control, 100% assistance from our  
office

5. Up to 4 vessels managed with one station

6. Modbus Hamilton sensors: pH  
gel, polarographic or optical  
dO<sub>2</sub> included in the entry model.

7 N.4 assignable peristaltic pumps, all  
speed controlled.

8. Sterile multiple sampling  
system.



flexibility at work

Solaris with 12 different volumes and ratio (diameter/height) has probably the most various range of standard bioreactor/fermenters on the market, giving his clients the flexibility needed to find the right solution for their application.

VOLUME (litres)



D/H

	VESSEL											
Total Volume (liters)	2,00	3,00	3,00	4,00	4,00	4,50	5,00	5,50	6,00	7	8	10
Ratio D/H	1:2.0	1:2.5	1:1.5	1:2.0	1:3.0	1:1.5	1:4.0	1:2.5	1:2.0	1:3.5	1:2.0	1:3
Min. Working Volume (liters)	0,9	0,9	1,00	1,00	0,9	1,2	1,00	1,00	1,2	1,1	1,2	1,3
Max. Working Volume (liters)	1,5	2,25	2,25	3,00	3,00	3,40	3,75	4,00	4,50	5,25	6,00	7,50
n.16 Headplate Ports	n.1 port, Gas Sparger Input n.1 port, Gas overlay n.1 port, Gas out/Condenser n.1 port, Sampling system n.1 port, Harvesting system n.1 port, Temperature Sensor						n.1 port, Antifoam probe n.1 port, pH sensor n.1 port, pO <sub>2</sub> sensor n.4 port, Sterile connections n.3 port, spares n.1 port, Agitation Group					
	DIMENSIONS FOR AUTOCLAVE											
Height (mm)	380	460	380	460	530	380	635	530	460	635	530	635
Diameter (mm)	225	225	240	240	225	280	225	240	280	240	280	280
Design	Borosilicate Glass Jacketed Vessel											
Materials	Vessel: Borosilicate Glass Others : AISI 316 L											
	AGITATION											
Drive	Brushless Motor Direct Assembly, Accuracy 1 RPM 1-2000 RPM											
Impellers	Select from: Rushton Type, Marine type											
	THERMOREGULATION											
Control	PID Control for Heating and Cooling, Accuracy: 0.1°C Jacket Water Heater											
	AERATION											
Gas Control	TMFC for sparger select from 1 to 5 TMFC											
Gas Mixing (Air,N <sub>2</sub> ,CO <sub>2</sub> ,O <sub>2</sub> )	Select from: Toro type (ring), Syntered microbubbling, both provided with 0.2μ disposable filter											
Sparger Type	Optional: TMFC											
Gas Overlay	0.2μ disposable filter - Stainless Steel condenser placed on the exhaust gas in order to avoid the media loss											
Exhaust												
	pH											
Sensor	Gel digital Hamilton Sensor with diagnostic analysis technology											
Control	Measuring and Control resident in the LEONARDO System (PID)											
Actuators	Cascade to peristaltic pumps for the addition of acid/basic solution and gases											
	pO <sub>2</sub>											
Sensor	Polarographic or optical digital Hamilton Sensor with diagnostic analysis technology											
Control	Measuring and Control resident in the LEONARDO System. Auto controlled through variations in the speed of agitation and/or the flow of gas and/or the speed of nutritile additions,etc											
Actuators	RPM, gases flow, the nutritile additions, etc. according to the control procedure selected											
	FOAM / LEVEL											
Sensor and Controls	Solaris sensor. Measuring and Control resident in the LEONARDO System											
	PERISTALTIC PUMPS											
Peristaltic Pumps	4 Pumps Watson&Marlow all speed controlled, 4 assignable application from software											
	CONTROLLER											
Master Control Module	Control 1 to 4 vessels Dimensions:      Height: 230 mm      Largeness: 455 mm      Depth: 350 mm											
HMI with LEONARDO software	18,5" Touch screen PC											
Utility Station	Required for optional 2nd,3rd or 4th reactors, including 1 to 4 pumps and all utilities Dimensions:      Height: 230 mm      Largeness: 455 mm      Depth: 350 mm											

OPTIONS

Sterile Multi (4)Sampling System  
Autoclavable Bottle 250/500 ml with screw cap, filter, and connections  
Spare parts kit (OR-SET, pH storage solution,O<sub>2</sub> electrolyte solution, buffer 4, buffer 7, FDA grease, mechanical tools)



# POP your pcs!



Colors... whatever suits your fancy

## HMI



Purple Haze



Blue Moon



Ruby Tuesday



Big Yellow Taxi



Black Bird



White Queen

## Control Cabinet



Back in Black



White Album



My Baby Blue



Purple Rain



Yellow Submarine



Green Day



# JUPITER Multi

A single unit is composed by a Master Control Station that includes a controller and 18,5" touchscreen monitor HMI

capable of running one to four bioreactors. Additional Utility Stations can manage 2nd, 3rd and 4th bioreactor(s)



The road to modularity



With LEONARDO  
your process is easily and efficiently managed by  
this innovative, user friendly and powerful Process  
Control System.



*Stressed over boring Dress Codes?  
Take it easy and go for disposable*



Single use SUB and SUF platforms able to satisfy any demand up to 25 litre Working Volume range.  
Head-Plate-Drive or Magnetic-Stirrer-Table available.

in partnership with **CerCell**



# JUPITER Single-Use

## Stirred-Tank Bioreactor

CellVessel™ series of Single-Use-Bioreactors (SUB) for batch and fed-batch cultivation of various cell lines in suspension applications are unique as they are fully configurable and meet any design request in a scalable platform ranging 0,25-28 litre Working-Volume (WV).

### Basic specifications:

- PC (polycarbonate) vessel in 5 different diameters and 4 different height = 13 different sizes
- PC cover with a number of PG13.5 ports according to the diameter
- Rigid design for stable servo motor connection

### Benefits

1. Reduced start up costs
2. Cut out downtime of cleaning and autoclaving
3. Reduced validation
4. Reliable scalability (stirred tanks design)

### Fully configurable CellVessel™ may be created by selecting components from:

1. A range of impeller(s), any rotation or direction for up-flow / down-flow / axial / radial fluid circulation for any application.
2. Temperature controlled with electrical heating blankets and/or with waterborne heating/cooling blanket.
3. Various aeration methods; such as micro pore spargers, hole spargers, head space gas exchange.
4. Baffled stator for axial vortex mixing, donut shape flow pattern for improved mass transfer for increased productivity.

5. Brushless motors.

6. 7 different exhaust methods.



7. 5 different liquid In&Out methods.



8. A range of Single-Use-Sensor (SUS).



9. 1 TMFC in the entry model.  
Gas mixing: up to 5 TMFC (Air, CO<sub>2</sub>, N<sub>2</sub>, O<sub>2</sub> and Overlay).

10. 17.5" touch display.

11. LEONARDO: smart controller designed to provide an high level of automated management of the fermentation processes. Remote Control, 100% assistance from our office.

12. Up to 4 vessels managed with one station.

13. N.4 software assignable peristaltic pumps, **all speed controlled.**

14. Compact master control station.  
Universal power supply 100-240 V.  
Rear module with 3 removable technical trays (power, control, process) to facilitate the after sales service.



# JUPITER Single-Use

## Stirred-Tank Fermenter

BactoVessel™ series of Single-Use-Fermenters (SUF) for batch and fed-batch microbial applications are unique as they are fully configurable and meet any design request in a scalable platform ranging 0,25-28 litre Working-Volume (WV).

**Fully configurable CellVessel™ may be created by selecting components from:**

1. A range of impeller(s), any rotation or direction for up-flow / down-flow / axial / radial fluid circulation for any application.
2. Temperature controlled with electrical heating blankets and/or with waterborne heating/cooling blanket.
3. Various aeration methods; such as micro pore spargers, hole spargers, head space gas exchange.
4. Baffled stator for axial vortex mixing, donut shape flow pattern for improved mass transfer for increased productivity.
5. 7 different exhaust methods.



6. 5 different liquid In&Out methods.



7. A range of Single-Use-Sensor (SUS).
8. **Brushless motors**, from 1 to 2000 RPM.



9. N.4 software assignable peristaltic pumps, **all speed controlled**.



- 10.1 TMFC in the entry model.  
Gas mixing: up to 5 TMFC (Air, CO<sub>2</sub>, N<sub>2</sub>, O<sub>2</sub> and Overlay).

11. **18.5"** touch display.

12. **LEONARDO**: smart controller designed to provide an high level of automated management of the fermentation processes.  
Remote Control, 100% assistance from our office.

13. Up to 4 vessels managed with one station.



14. Compact master control station.  
Universal power supply 100-240 V.  
Rear module with 3 removable technical trays (power, control, process) to facilitate the after sales service.

### Basic specifications:

- PC (polycarbonate) vessel in 5 different diameters and 4 different height = 13 different sizes
- PC cover with a number of PG13.5 ports according to the diameter
- Rigid design for stable servo motor connection

### Benefits

1. Reduced start up costs
2. Cut out downtime of cleaning and autoclaving
3. Reduced validation
4. Reliable scalability (stirred tanks design)



Set up your JUPITER Single-Use



Ask for the Configurator Tool for  
your own SUB/SUF design!

CellVessel™ and BactoVessel™ frequently requested volumes

Vessel volume (ml)	OD110	OD130	OD150	OD200	OD250
N. of PG13.5 ports	6	7	9	10	12
245 mm height	2,100	3,000			
340 mm height		4,100	5,600	10,300	15,700
420 mm height		5,100	6,900	13,400	19,300
520 mm height			8,500	16,500	23,800
620 mm height			10,100	19,600	28,300

The smallest Cell/Bacto Vessel offers WV from 50 ml.





Esedra series bioreactors/ fermenters have been created with the intention to face all the problems related to scaling-up, from the laboratory to the pilot and productive stage, with maximum easiness and flexibility. Esedra series units has the same hardware

control configuration of pilot and industrial bioreactors/ fermenters; fitted with a measurement and control system based on a PLC and the SCADA supervisory Solaris SBC-14. The system is in accordance with CFR 21 Part 11.



Vessels from 1 up to 20 L.

Instrumentation (sensors inclusive) for control and measurement of pH, Eh, dO<sub>2</sub>, CO<sub>2</sub>, RPM, Gas Mixing, Temperature, Antifoam, Feeds turbidity, weight.

SCADA Control System SBC-14.

Software management data - trends.

Designed for microbial and cell cultivations.

Complete range of accessories.

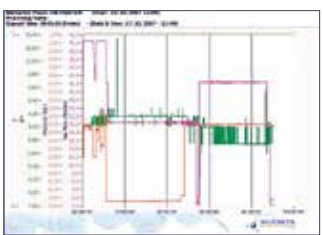
Mechanic or magnetic agitation system.



SBC-14 system

Smart controller for pilot and industrial plants. In accordance with 21 CFR Part 11

This applications program is designed to provide a high level of automated management of the fermentation processes.



# ELARA

*photobioreactor*



ELARA is the last evolution of photobioreactor systems by Solaris.

Designed for cultivation of phototropic organisms including plant cells, bacteria, moss and microalgae.



# ELARA photobioreactor

The light intensity is dimmable from 0–100% up to 3000  $\mu\text{mol}(\text{photon})/\text{m}^2$ , probably the most powerful system on the market.



- Features
- Integrated thermoregulation system
  - Instrumentation (sensors inclusive) for control and measurement of pH,  $\text{dO}_2$ , RPM, Gas flow rate, Gas Mixing, Temperature, illumination level, substrate addition, turbidity. SCADA Control System.
  - Software management data - trends.
  - $\text{CO}_2$  addition via pH control or manual gas control
  - Illumination intensity control via cell concentration

SBC-14 system

Smart controller for pilot and industrial plants. In accordance with 21 CFR Part 11

This applications program is designed to provide a high level of automated management of the fermentation processes.



Designed by Architect Alberto Ruggeri





## GENESIS

Standard sterilizable in place solutions

Genesis is a R&D Sterilizable-In-Place Benchtop Bioreactor/Fermenter available from 7,5 up to 20 liters total volume. Automatic sterilization through electric heaters (no need for an external steam source) or in alternative by steam.  
Applications:  
Bacteria/cell cultivations

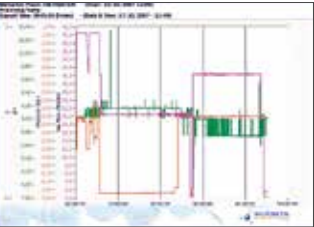


# GENESIS

STANDARD STERILIZABLE IN PLACE SOLUTIONS



SBC-14 system  
Smart controller for pilot and industrial plants. In accordance with 21 CFR Part 11  
This applications program is designed to provide a high level of automated management of the fermentation processes.



Set up your GENESIS

	VESSEL			
Total Volume (liters)	7,50	10,00	15,00	20,00
Min. Working Volume (liters)	1,87	2,50	3,75	5,00
Max. Working Volume (liters)	5,63	7,50	11,25	15,00
Design	Stainless Steel Jacketed Vessel			
Materials	Vessel : AISI 316 L			
	Others : AISI 304			
AGITATION				
Drive	Brushless Motor Direct Assembly, Accuracy 1 RPM			
RPM	1-2000	1-2000	1-1500	1-1500
Impeller	Select from: Rushton Type, Marine type			
IN SITU STERILIZATION /THERMOREGULATION				
Control	PID Control for Heating and Cooling, Accuracy: 0.1°C			
	Jacket: Steam or Electric Heating /Cooling Source			
AERATION				
Gas Control	TMFC for sparger			
Gas Mixing (Air,N <sub>2</sub> ,CO <sub>2</sub> ,O <sub>2</sub> )	select from 1 to 4 TMFC			
Sparger Type	Select from: Toro type (ring), Syntered microbubbling, both provided with 0.2μ filter			
Gas Overlay	Optional: TMFC			
Exhaust	0.2μ filter Optional: Stainless Steel condenser placed on the exhaust gas in order to avoid the media loss			
PRESSURE				
Sensor	Hi Precision Electronic Pressure Transmitter			
Visualization	Measuring resident in the SBC-14 System			
Actuators	Automatic Diaphragm Valve			
pH				
Sensor	Gel Hamilton sensor with modbus communication			
Control	Measuring and Control resident in the SBC-14 System (PID)			
Actuators	Cascade to peristaltic pumps for the addition of acid/basic solution and gases			
pO <sub>2</sub>				
Sensor	Polarographic or optical Hamilton sensor with modbus communication			
Control	Measuring and Control resident in the SBC-14 System. Auto controlled through variations in the speed of agitation and/or the flow of gas and/or the speed of nitrilite additions,etc			
Actuators	RPM, gases flow, the nitrilite additions, etc. according to the control procedure selected			
FOAM / LEVEL				
Sensor and Controls	Solaris sensor. Measuring and Control resident in the SBC-14 System			
PERISTALTIC PUMPS				
Peristaltic Pumps	4 Pumps, configurable application from software			
CONTROLLER				
Master Control Module	Control 1 to 4 vessels			
	Dimensions:	Height: 230 mm	Largeness: 455 mm	Depth: 350 mm
HMI with SBC-14 software	18,5” Touch screen PC			
Utility Station	Required for optional 2nd,3rd or 4th reactors, including 1 to 4 pumps and all utilities			
	Dimensions: Height: 230 mm Largeness: 455 mm Depth: 350 mm			

## OPTIONS

Autoclavable Bottle 250/500 ml with screw cap, filter, and connections.  
Spare parts kit (OR-SET, pH storage solution,O<sub>2</sub> electrolite solution, buffer 4, buffer 7, FDA grease, mechanical tools).  
Turbidity, CO<sub>2</sub> and Redox measurement (sensor, cable, software-part of SBC-14)  
Weight control through load Cells.





# POP your PCs!



Colors... whatever suits your fancy



HMI



Purple Haze



Blue Moon



Ruby Tuesday



Big Yellow Taxi



Black Bird



White Queen

Control Cabinet



Back in Black



White Album



My Baby Blue



Purple Rain



Yellow Submarine



Green Day



# Pilot & Industrial Bioreactors / Fermenters





# M series

Standard sterilizable in place solutions

M series are steam in place bioreactors/ fermenters available in a range of volumes from 30 up to 200 litres.



M series

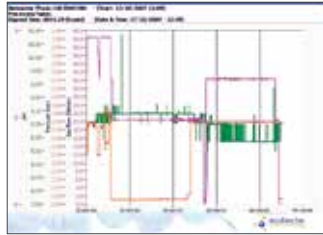
Instrumentation (sensors inclusive) for control and measurement of pH, Eh, dO<sub>2</sub>, CO<sub>2</sub>, RPM, Gas Mixing, Temperature, Antifoam, Feeds, turbidity, weight,etc.  
SCADA Control System.  
Software management data - trends.  
Designed for microbial and cell fermentation.  
Complete range of accessories.



SBC-14 system

Smart controller for pilot and industrial plants. In accordance with 21 CFR Part 11

This applications program is designed to provide a high level of automated management of the fermentation processes.



Set up your M series



OPTIONS

Autoclavable Bottle 250/500/1000/2000 ml with screw cap, filter, and connections.  
Spare parts kit (OR-SET, pH storage solution,O<sub>2</sub> electrolyte solution, buffer 4, buffer 7, FDA grease, mechanical tools).  
Turbidity, CO<sub>2</sub> and Redox measurement (sensor, cable, software-part of SBC-14).  
Weight control through load Cells.



	VESSEL					
Total Volume (liters)	30,00	50,00	75,00	100,00	150,00	200,00
Min. Working Volume (liters)	22,50	37,50	56,00	75,00	112,00	150,00
ratio (D/H)	1:2.5	1:2.5	1:2.5	1:2.5	1:2.5	1:2.5
Design	Stainless Steel Jacketed Vessel					
Materials	Vessel : AISI 316 L					
	Others : AISI 304					
	AGITATION					
Drive	Brushless Motor Direct Assembly					
Impeller	Select from: Rushton Type, Marine type					
	THERMOREGULATION					
Control	PID Control for Heating and Cooling, Accuracy: 0.1°C					
	Jacket: steam or electric heaters /cooling source					
	AERATION					
Gas Control	TMFC for sparger					
Gas Mixing (Air,N <sub>2</sub> ,CO <sub>2</sub> ,O <sub>2</sub> )	select from 1 to 4 TMFC					
Sparger Type	Select from: Toro type (ring), Syntered microbubbling, both provided with 0.2μ disposable filter					
Gas Overlay	Optional: TMFC					
Exhaust	0.2μ disposable filter					
	Stainless Steel condenser placed on the exhaust gas in order to avoid the media loss (option)					
	PRESSURE					
Sensor	Hi Precision Electronic Pressure Transmitter					
Visualization	Measuring and Control resident in the SBC-14 System					
Actuators	Automatic Diaphragm Valve					
	pH					
Sensor	Gel Hamilton sensor with modbus communication					
Control	Measuring and Control resident in the SBC-14 System					
Actuators	Cascade to peristaltic pumps for the addition of acid/basic solution and gases					
	pO <sub>2</sub>					
Sensor	Polarographic or optical Hamilton sensor with modbus communication					
Control	“Measuring and Control resident in the SBC-14 System. Auto controlled through variations in the speed of agitation and/or the flow of gas and/or the speed of nutilite additions,etc”					
Actuators	RPM, gases flow, the nutilite additions, etc. according to the control procedure selected					
	FOAM / LEVEL					
Sensor and Controls	Solaris sensor. Measuring and Control resident in the SBC-14 System					
	PERISTALTIC PUMPS					
Peristaltic Pumps	4 Pumps Watson&Marlow - speed control (option), assignable application from software					
	CONTROLLER					
Controller	PLC					
HMI with SBC-14 software	18,5” Touch screen PC					



# S series

SIP Pilot Scale Bioreactors/ Fermenters

S series bioreactors / fermenters have been created with the intention to face all the problems related to the scaling-up, from the laboratory to the the productive stage, with maximum easiness.

All fermenters/bioreactors of this series are compact and flexible with the possibility to be installed even in limited space places.

**100% Customized solutions**





- Culture vessels from 5 to 200 L.
- Instrumentation (sensors inclusive) for control and measurement of pH, Eh,  $\text{dO}_2$ ,  $\text{CO}_2$ , RPM, Gas Mixing, Temperature, Antifoam, Feeds, Turbidity, Weight, etc...
- SCADA Control System SBC-14.
- Software management data - trends.
- Designed for microbial and cell fermentation, for batch, fed-batch and continuous processes.
- Complete range of Accessories.
- Mechanic or magnetic agitation system.



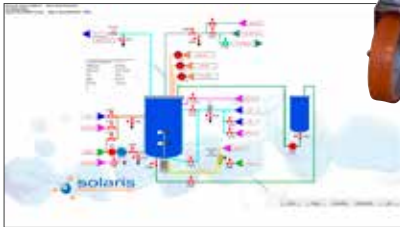
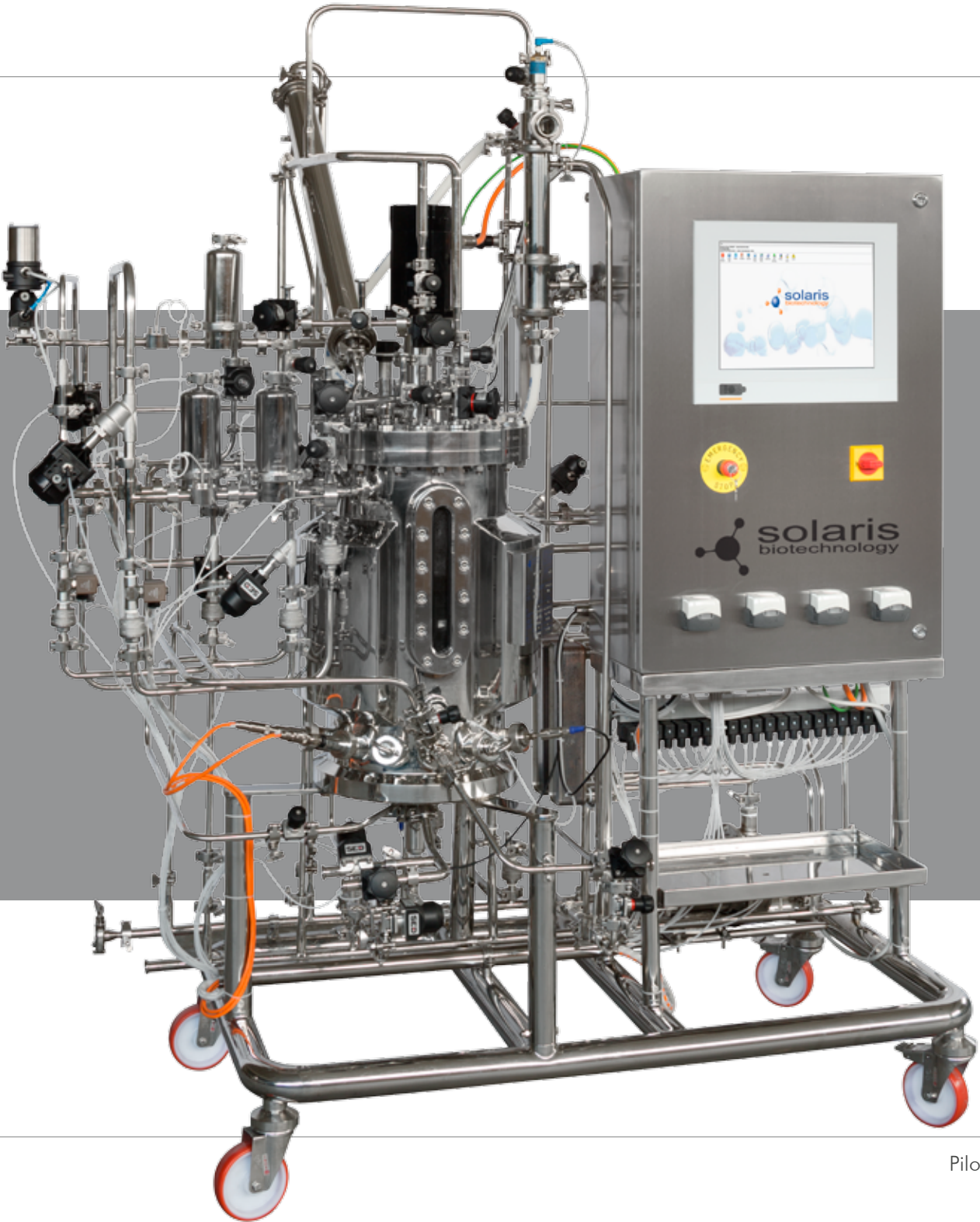


S series - SIP Pilot Scale Bioreactors/Fermenters

Completely assembled and tested in the factory, these fermentation units are ready for installation at the user' site.  
The control system is based on a PLC and the SCADA supervisory Solaris SBC-14 and is designed to provide an high level of automated management of the fermentation processes; installed from Esedra up to industrial I series facilities the scaling-up procedures.  
The system is in accordance with CFR 21 Part 11.



SBC-14 system  
Smart controller for pilot and industrial plants. In accordance with 21 CFR Part 11  
This applications program is designed to provide a high level of automated management of the fermentation processes.

A table with multiple columns and rows, likely representing process data or parameters. The columns are labeled with various variables, and the rows show data points over time or for different conditions.

Hamilton RetractoFit Bio 25



**GMP Customized solutions:**

fully automated, strongly engineerized to fulfill the customer needs of compactness and operability. Top quality stainless steel with excellent finishing, high technology and italian design. On line removable and sterilizable sensors permits their replacement during the process without compromising the sterility. Steam bridge diaphragm valves to guarantee the sterility during inoculum, sampling, harvesting and feedings. Easy to access service lines for performing the maintenance job without any difficulty.



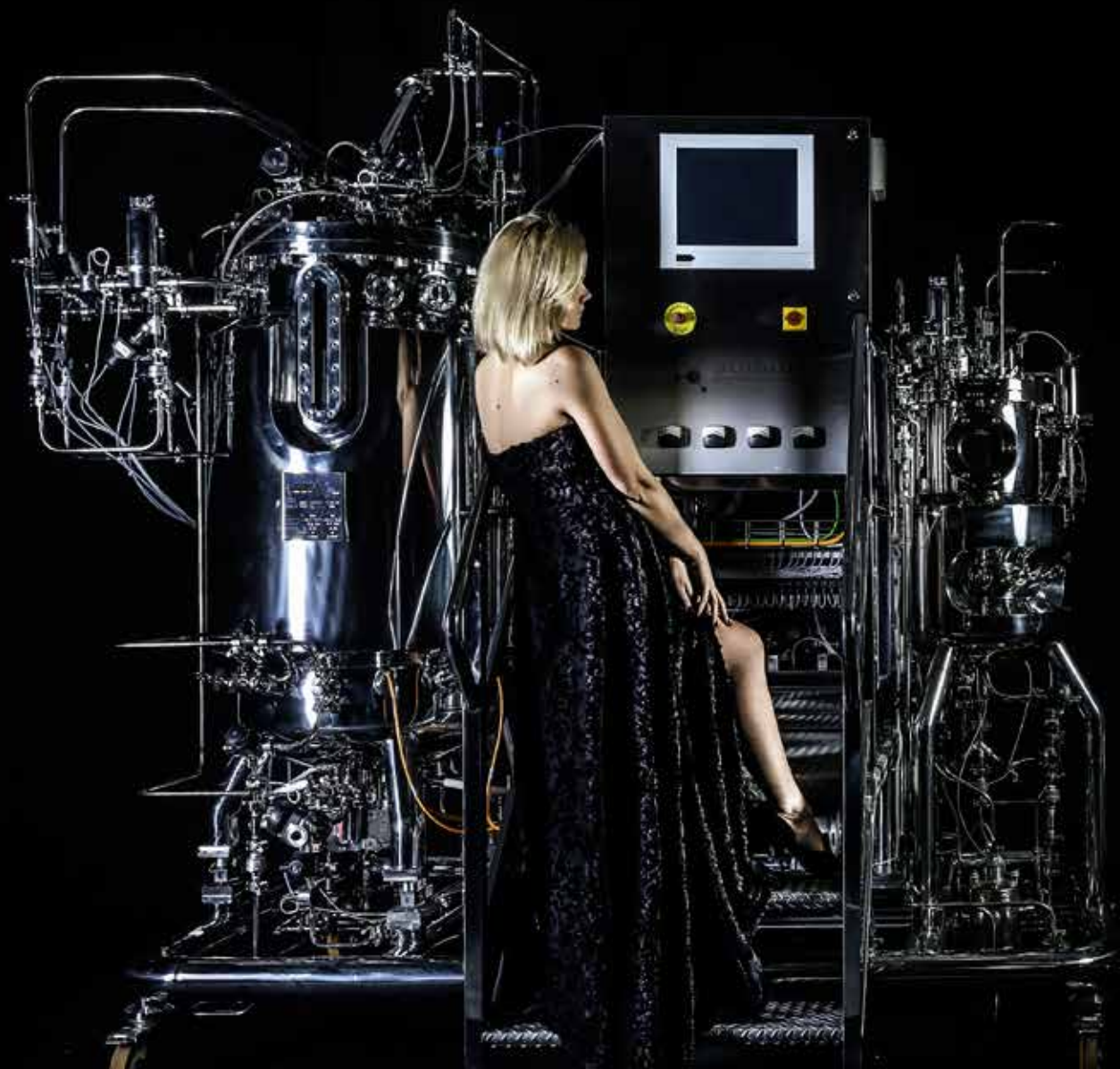
ZAC Sampling bottle



| series

Industrial Scale Bioreactors/ Fermenters

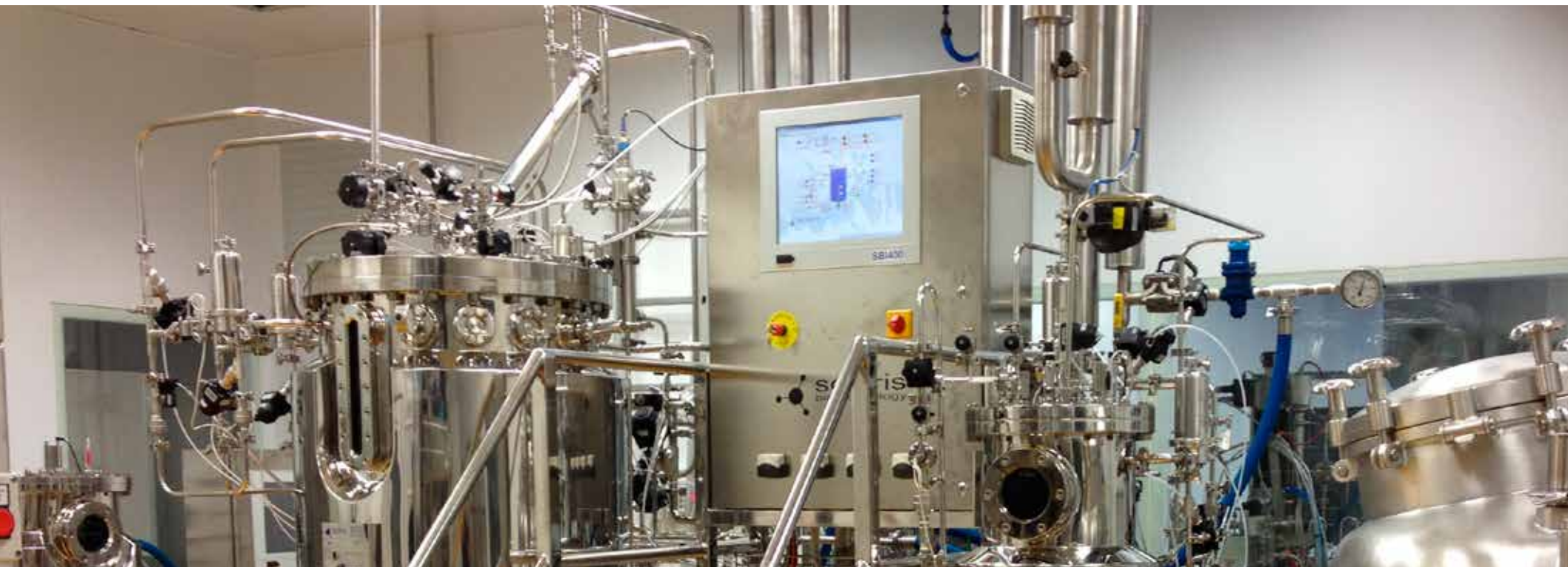
Bioreactors - Fermenters of the I series are highly automated fermentation systems, available from 250 litres up to 30 m<sup>3</sup> fully customised.



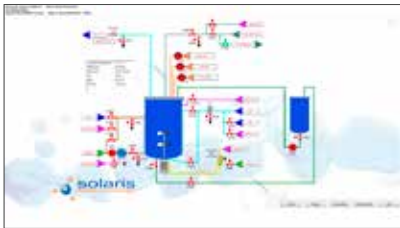




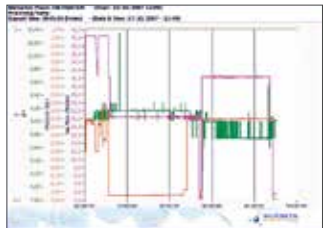




SBC-14 system  
Smart controller for pilot and industrial plants. In accordance with 21 CFR Part 11  
This applications program is designed to provide a high level of automated management of the fermentation processes.



Parameter	Setpoint	Actual	Unit	Alarm
Temperature	30.0	30.5	°C	OK
pH	7.0	7.2		OK
Dissolved Oxygen	50%	45%	%	OK
Agitator Speed	1000	1000	rpm	OK
Feed 1	100 L/h	100 L/h	L/h	OK
Feed 2	50 L/h	50 L/h	L/h	OK
Recycle Flow	200 L/h	200 L/h	L/h	OK
Pressure	1.0 bar	1.0 bar	bar	OK
Level	80%	80%	%	OK
Valve Position	Open	Open		OK







# Process Plants

Single Process Equipment, Engineering and Turnkey Projects

Solaris provides all path required for the design and realization of complete integrated process plants, from the feasibility studies to the start up.



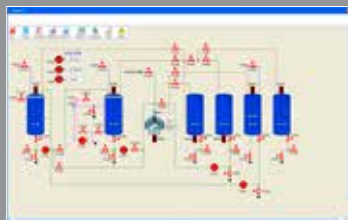




- **CONSULTANCY**  
GMP audit  
Project URS preparation  
Feasibility Study  
Conceptual Design  
Process Simulation

- **ENGINEERING & MANUFACTURING**

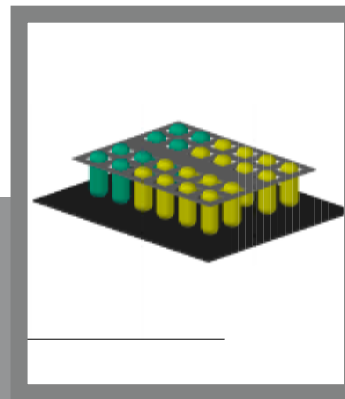
- **HANDOVER**  
Commissioning  
Qualification /Validation  
Start-up & training



Thought



Feasability Study



Project



Manufacturing



Delivery



Installation &  
Validation



Personnel  
Training





Atmospheric, under pressure and under vacuum tanks. Excellent finishing granted by high tech automatic polishing machines, different kinds of heat exchanging, mixing solutions, taylor made systems for varied products and applications, PED, ATEX, SVTI certifications.



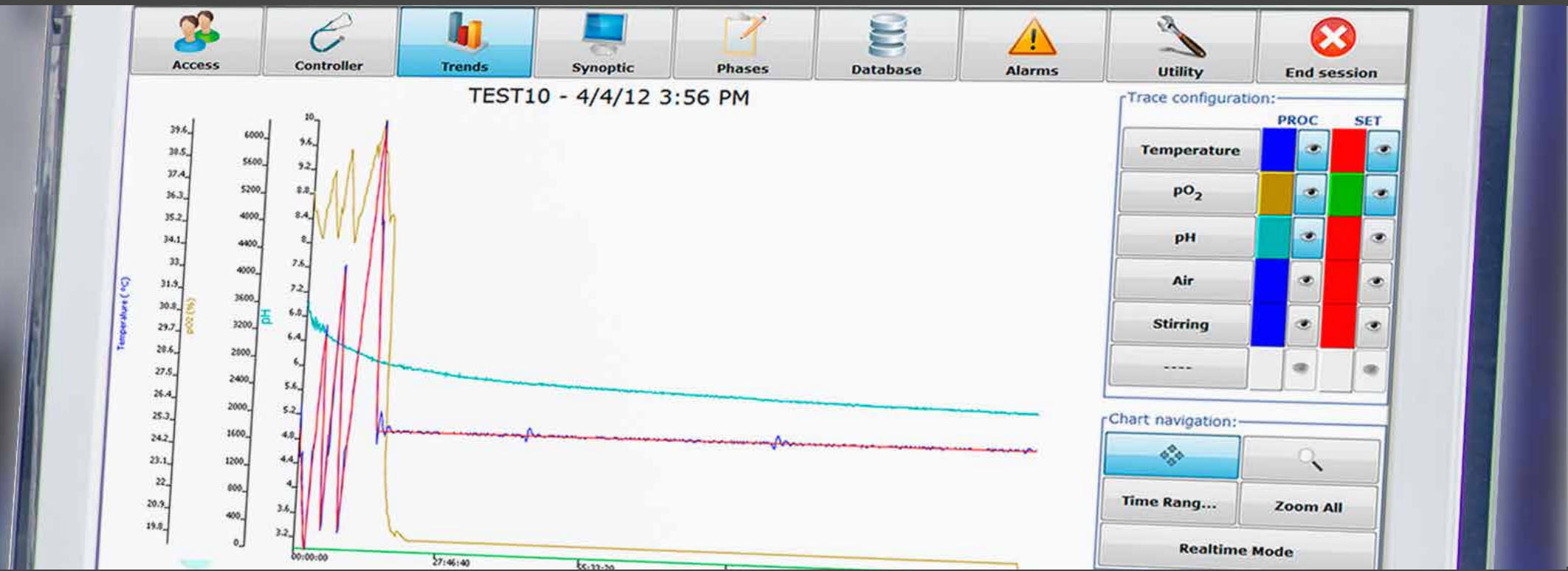




# Controllers

Leonardo & SBC-14

Solaris develops advanced software systems for managing fermentation and downstream processes, local or remote control, from the single equipment up to the productive industrial plant.





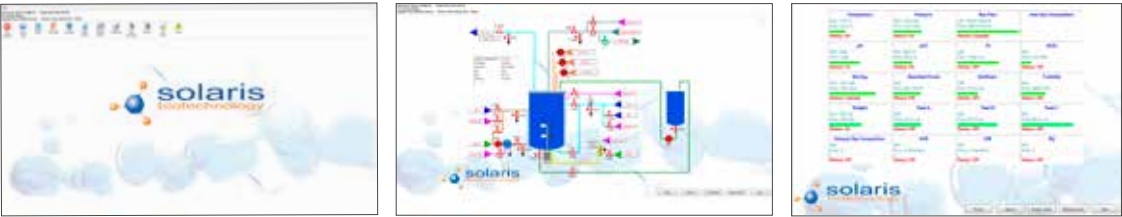
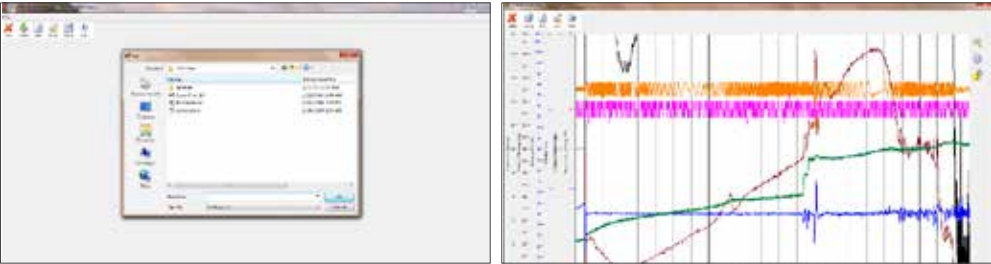
# LEONARDO

LEONARDO smart touch screen controller for R&D bioreactors / fermenters

- Multi-level password protection
- User friendly fermentation management
- Controller page to view setpoints, process values and control mode, to set up customized PID (or use factory defaults) and alarm limits
- Continuous trends representation to track, print and export data.
- Different dynamic zooms and configurations.
- On line parameters calibration
- Events log and alarm register
- Possibility of saving recipes for repeat usage
- Remote control for after sale assistance

## Solaris Fermentatio Manager

Data extracted from SBC-14 are compatible with Window Excel. However, Solaris has developed a platform where to easily and quickly manage fermentation data. This software is included in the fermenter supply and it can be installed on unlimited number of client's PC or laptop.



SBC-14 smart controller for pilot and industrial plants

- Home with Multi-level password protection.
- Synoptic page with manual operation of all the actuators (pumps, valves etc.).
- Controller page to easily view setpoints, current values and control mode, to set up customized PID (or use factory defaults) and alarm limits.
- SBC-14 is managing different phases of the fermentation process: stand by phase for cleaning procedures or maintainance, fully automatic sterilization program (with media or empty), before cultivation (automatic phase after sterilization managing the pre-inoculum) and cultivation with control modes set up: set point maintenance, set point profiles and cascade.
- Continuous trend graphs representation to track, print and export data on up to 4 process and set point variables. Different dynamic zooms and configurations in a time frame that can be set interactively.
- Producing setpoint profiles of the variables over time.
- Pumps Configurator.

## Solaris Logic Parser

Solaris Logic Parser, integrated in the SBC-14 gives to the user additional possibilities of controls putting in relation all the variables involved in the fermentation process with common logic functions. The communication between the software SBC-14 and the software logical Fermenter is via exchange database.The save / recall diagrams is synchronized to save / recall of the recipes from the software Fermenter.



# SBC-14 SYSTEM

- On line parameters calibration.
- PID setting
- USB connection for free data extracting.
- Remote control for after sale assistance. 100% assistance from our office.
- Possibility of saving up to recipes for repeat usage.
- Attribution to the variables of maximum and minimum values to act as alarm thresholds.SMS alarm service through internal modem.
- Connection via Ethernet to other fermenters, connected instruments and supervision computers.
- Print-out of hard copy of each screen.

# Gas Analyser



O<sub>2</sub> concentration in the sample is measured by means of a transducer based on the zirconium dioxide properties of this gas, whereas CO<sub>2</sub> determination is based on the measurement of absorption of infrared (IR) radiation.

Solaris GA is equipped with an inlet line selector (multiplex) that allows the unit to be connected with up to 12 bioreactors, and includes a pump for gas sampling and a gas drying device.

The concentration values of two gases are visualised on the monitor, are analysed

and represented graphically ON LINE, with subsequent culcation of the respiration coefficient.

- Acquisition of data in real time and conversion of the signals from the sensors applied to the process into values expressed in the specific units of measurement of each variable.

- Continuous graphic representation of the the behaviour of O<sub>2</sub>, CO<sub>2</sub>, OUR, RQ, with possibility of changing configuration, scale, dynamic zoom and exporting graphs on a printer.

- Channel Configuration with possibility to set the reading parameters of gas to analyse.

- Probes Calibration

- Temperature Compensation

- Calculation of:

OUR (Oxygen Uptake Rate)

CER (Carbon Dioxide Evolution Rate)

RQ (Respiratory Quotient)

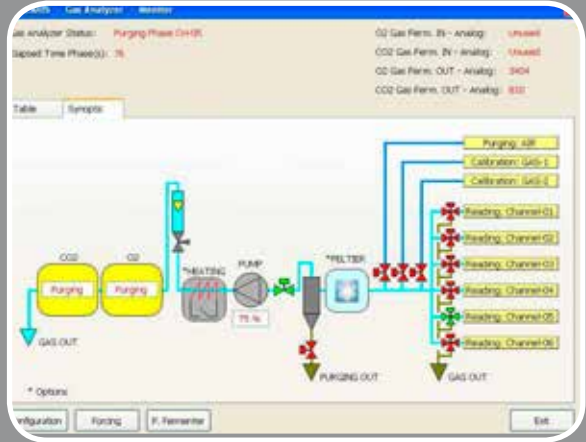


**Solaris** Gas Analysers are a combined CO<sub>2</sub> and O<sub>2</sub> analyser, specifically designed to be used in fermentation processes.



**UP TO 8  
FERMENTERS  
CONNECTED!**

O<sub>2</sub> and CO<sub>2</sub> are the gases whose rates of consumption or production are most frequently measured for the purposes of study and process control (energetic metabolism, substrate utilisation, etc.). The measuring ranges of the GA analyser (0 ÷ 10 or 15% for CO<sub>2</sub>, and 21 ÷ 10% for O<sub>2</sub>) have been chosen specifically for your application. The system is based on well-proven, high quality transducers, and is characterised by an extremely reduced internal volume, to reduce overall response times.



Channel	Mode	O <sub>2</sub> Pct (%)	CO <sub>2</sub> Pct (%)	Gas Flow (STP L/min)	Working Volume (L)
Channel-01	Manual	0.0	0.0	0.0	0.0
Channel-02	Manual	0.0	0.0	0.0	0.0
Channel-03	Manual	0.0	0.0	0.0	0.0
Channel-04	Manual	0.0	0.0	0.0	0.0
Channel-05	Manual	0.0	0.0	0.0	0.0
Channel-06	Manual	0.0	0.0	0.0	0.0

# Downstream Equipment



Solaris biotechnologies posses the know how for choosing between the best membrane available on the market (in terms of materials, geometrical configuration and operative parameters), for:

- concentrating with the best efficiency
- avoiding the problem of the gel layer
- increasing the efficiency in Diafiltration

choosing the most suitable membrane  
In summary, optimizing the ratio cost/profit. The innovation drive of Solaris Biotechnology has created two new series of equipments, based on the technology of Tangential Flow Filtration. These equipments are devoted to the Recovery of biotechnological products in Downstream Operations.





TYTAN 100  
Micro / Ultrafiltration Unit  
Equipped with ceramic  
tubular membranes

# Tytan series

The TYTAN series are based on Microfiltration and Ultrafiltration techniques and operate in the ranges of low pressures (1-5 bar).

Geometrical configurations of membranes available on the market:

- spiral wound
- hollow fiber
- cassettes
- tubular ceramic



TYTAN 500  
Microfiltration Unit

# C.I.P. & S.I.P. Systems



Solaris develops C.I.P. / S.I.P. systems for reliable and repeatable processes that covers strong hygiene regulations demanded by the food, dairy, biotechnology and pharmaceutical industries.





Single or Multi-tank configuration, with independent, stainless steel tanks used to hold water of different quality, Deionized water (DI), hot or cold water for injection (WFI) and water from reverse osmosis units (RO).  
Washing Cyclic Operations in sequences: Wash down rinse, Acid wash , Alkaline wash, Wash down, Final wash. Fully automated or manual as well.

Washing processes controlled via the operation panel of the CIP/SIP unit.  
Touch screen HMI to set up washing processes: number of tasks / repetitions of tasks, amount of litres (water, WFI), dosage of detergents, temperature of the CIP fluid, washing pressure, purge (drainage of process equipment and CIP/SIP unit with compressed air ), total times.



# Education & Training



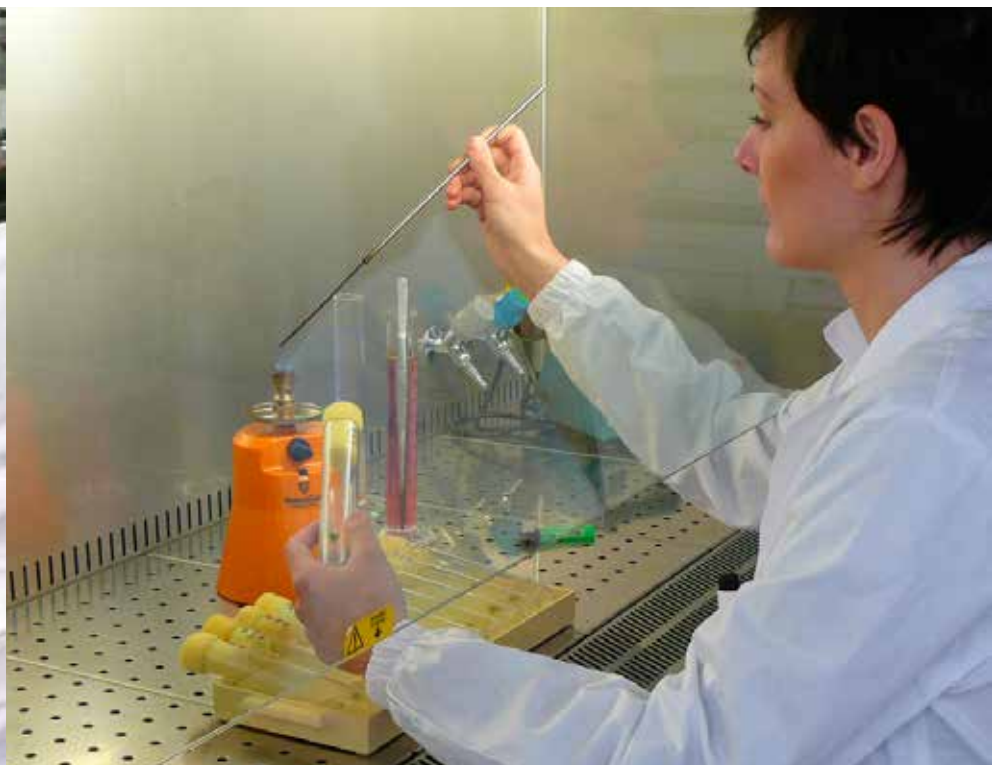
The approach and the type of practice which we are proposing are not just providing with relevant data or bibliographic research, but giving the opportunity of practical experiments which consist in a small scale realisation and verification of fermentation processes. Our collaborators are strongly present in

Italian and foreign market in the field of research and development of industrial biotechnological processes, also our products are being utilised in many famous research universities both in Italy and abroad. In particular, Solaris is providing: Training courses in biotechnology for teaching staff and students. Manual

practicum in biotechnology concerning the procedure, microorganisms and culture media. Training period for scholars in our pilot plant. The possibility to use our research laboratories for various training programs. Lectures and conferences on contemporary biotechnology.



# Fermentation and Biotech Development



MICRO MUNDI 's discovery-led R&D is a technologically advanced structure focused on microbiology , analysis and up-to-date recovery. Our experience and background are referred to the production at an industrial scale and our main skill is the knowledge of the issues involved in the commercial scale production , substantially different from the lab scale process. The R&D center is fully equipped for successful product and process development from bench to pilot scale and it is concerned with 4 major areas:

1. Strain selection and maintenance
2. Fermentation
3. Downstream processing
4. Analytical development

The development of technologies is based on:

1. Strain selection, maintenance and improvement
2. Process development , considering all metabolic , chemical and physical parameters useful to optimize the bioproduction.

We develop technologies which are strictly

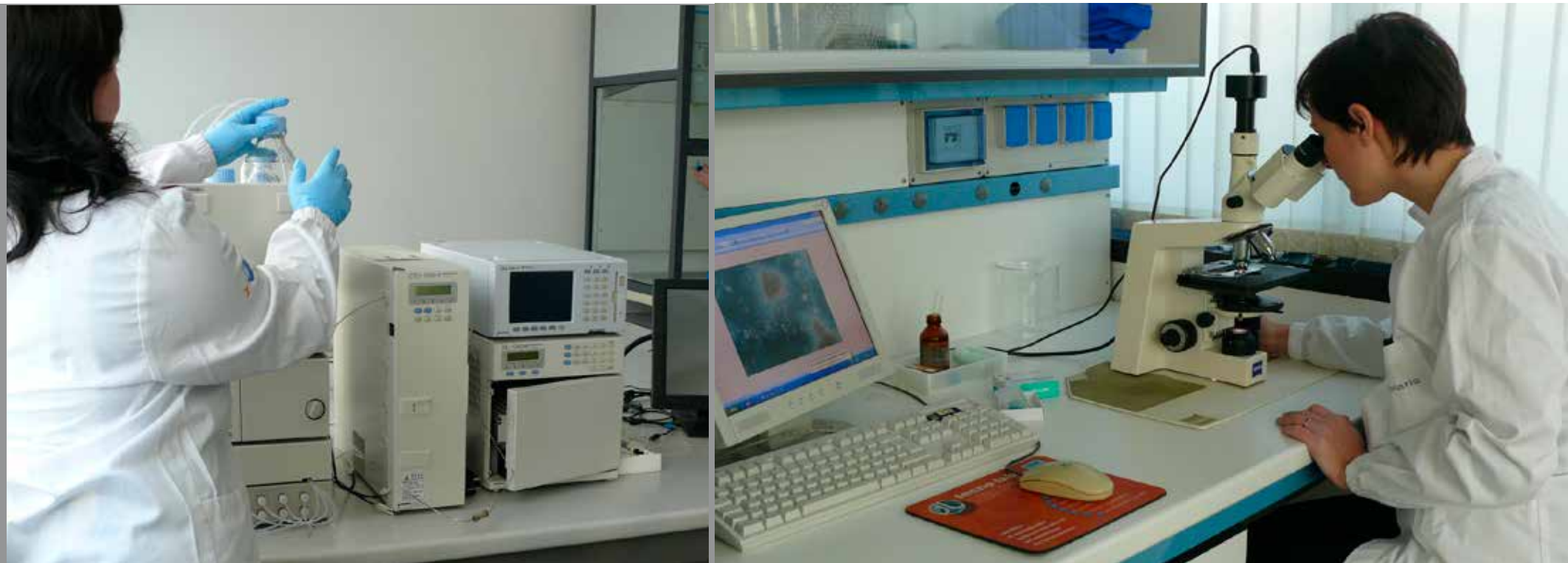
confidential and all biological and intellectual results are the property of our clients.

MICRO MUNDI has already experience in different fields like:

- Classical fermentation ( API, anti-tumoral, vitamins, etc)
- Biofuel
- Cell plant fermentation
- Bioremediation
- Mammalian cells

MICRO MUNDI is a department of Solaris Group, mainly involved in research and development of fermentation processes. Process scale-up from research and development up to the production at industrial scale. MICRO MUNDI brings a wealth of additional experience to your project, our staff have matured many years of experience in

managerial and technical positions in the biotech and pharmaceutical industry. This experience gives full confidence in the successful implementation of technologies. We cooperate with world-wide reputed private companies and public research institutes , in the development of new technologies and also in the improvement of the existing one.







Via Bachelet, 58  
46047 Porto Mantovano (MN)  
Tel. 0376 408760 - Fax 0376 385108  
**[www.solarisgroup.org](http://www.solarisgroup.org)**

*Photo: Bruno Gili*  
*Design: Paola Mazzoni - Edprint*

*Special Thanks to:*  
Dorina Maznic ARTElier  
Marco Bernardi ©Photography

© Solaris Biotechnology srl  
*All rights reserved*

*Release 14.01*  
printed in march 2014