Pure Process
CARL STUART GROUP

M series

STANDARD PILOT STERILIZABLE IN PLACE SOLUTIONS

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M SERIES

M series bioreactors and fermenters are Solaris' "standard" pilot plant scale platforms. There are 6 available standard vessel sizes ranging from 30 up to 200 L total volumes, completely configurable with an extensive range of options and accessories.

M Series typical applications includes the following:
Scale-up and scale-down studies
Pilot plant
Small productions

M series can be used for:
Biopharmaceutical
Biofuels
Food industry
Bioremediation
Bioplastic
Cosmeceutical
Nutraceutical

M Series
your scaling up guide

- 30 liters
- 50 liters
- 75 liters
- 100 liters
- 150 litres
- 200 liters

STANDARD STERILIZABLE IN PLACE SOLUTIONS

TK connection rather than TC ensures a better cleanibility and easier sterilization

Different gas mixing strategies with up to 5 TMFC

Automatic mechanical seal lubrication with steam condensate loop

Re-sterilizable addition system (steam bridge)

19" coloured touch screen industrial HMI
SBC16: smart controller designed to provide an high level of automated management of the fermentation/ cultivation processes
Customizable PID or factory default

Multiple sensors options
pH, dO2, Redox, Total Cell density, Viable Cell density, Conductivity,dCO2

Double jacket (side/bottom)
Increased heat transfer efficiency
It ensures optimal temperature control and sterilization even at minimum volumes

Top agitation, accurate **brushless motor**, from 1 to 2000 RPM.
Online absorbed Torques (Nm) and Power (W) measurements obtaining an indirect density indication of the culture broth.

N.2 heat exchangers and recirculating pump

Tri-Clamp stainless steel piping cGMP designed to provide a smooth,and non-contaminating environment. Provides leak-tight connections and it is flexible and adaptable to other forms of piping.

Separate drains
cooling return,condense to waste,hot condense return

Compact design

Modbus Digital sensors

Why a digital sensor?

Digital sensors (including Cell Density products) have been integrated to the Solaris PCS and Leonardo controlling software, giving the user many benefits over traditional analog sensor outputs. Such benefits include a robust communication protocol not susceptible to signal loss, in-software sensor diagnostic information, parallel calibration/batch calibrations and more.

Sensor life traceability

Reducing background noise

Gas mixing

Hardware and software adaptability are key to enable the best aeration strategy for each process. Thermal mass flow controlle (TMFC) allow precise flow rate control of individual gasses. Up to 5 TMFC's can be configured within each PCS cube a integrated to the controlling software. The powerful software and control platform allows precise cascade adjustment multiple parameters to manage gas transfer, OTR, kLa, etc.

- n.1 TMFC included in "entry" level system; additional available as optional
- Various agitator and baffle designs available
- Automatic gas mixing algorithms
- Toro, sintered and other spargers available

Leonardo 3.0

USER-FRIENDLY SOFTWARE

Solaris controlling software offers a simply laid out, yet powerful platform for experimental design planning and process control. The graphical user interface enables the intuitive selection and adjustment of control functions.
Extracted data is compatible with Window Excel but, in addition, Solaris offers a platform where fermentation data can be easily exported in real time and thus managed. This software is included in the supply and can be installed on an unlimited numer of the client's PC or laptops.

Workflow page

Data sheet

Vessel						
Solaris Code	**M serie 30**	**M serie 50**	**M serie 75**	**M serie 100**	**M serie 150**	**M serie 200**
Total Volume (liters)	30,00	50,00	75,00	100,00	150,00	200,00
Ratio D/H	1:3.0	1:3.0	1:3.0	1:3.0	1:3.0	1:3.0
Min. Working Volume (liters)	4,50	7,50	11,00	15,00	22,00	30,00
Max. Working Volume (liters)	21,00	36,00	55,00	75,00	110,00	145,00
Working temperature range	0-135°C					
Working pressure range	Up to 2 bar					
Design	Stainless Steel Jacketed Vessel					
Materials	Parts in contact with the culture AISI 316 L - other parts AISI 304					
Stirring						
Drive	Brushless Motor, Top Direct Assembly					
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), syntered microbubbling both provided with 0,2 µm filter					
Exhaust	Condenser and 0,2 µm filter (option)					

Options

Double mechanical seal
Vessel empty sterilization
Electrical heaters
Resterilizable addition system: Steam bridge (manual or automatic)
Peristaltic pumps (WM 114, WM 313, WM 520)
Gravimetric flow control (feed rate controlled through weight measurement)
Manual and automatic SIP harvest and sampling valves
CIP system: removable spray balls or integrated system (recirculating pump and n.2 removable spray balls + software automation)

Controls

Temperature	
Sensor	PT100
Control system	Measuring resident in Leonardo software
Control range	0 - 150°C
pH	
Sensor	Digital sensor
Control system	Measuring resident in Leonardo 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
Control system	Measuring resident in Leonardo 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
dCO_2	
Sensor	Analog sensor
Control system	Measuring resident in Leonardo 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 software
Pressure range	0-3 bar (option 1) , 0-10 bar (option 2)
Option 1	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	Viable cell density based on capacitance (Two ranges: 5x10^5 to 8x10^8 mammalian cells/ml - 5 to 200 g/L dry weight)
Redox (ORP)	
Sensor	Digital sensor
Control system	Measuring resident in Leonardo software
Control range	±2000 mV
Operation temperature	- 10 -130°C
Pressure range	≤ 6 bar
Conductivity	
Sensor	Digital sensor
Control system	Measuring resident in Leonardo software
Control range	1 - 3000 µS/cm
Operation temperature	0 -130°C
Pressure range	0 - 20 bar
Weight	
Sensor	n.3 load cells
Control	Measuring resident in Leonardo software
Antifoam/Level	
Sensor	Solaris sensor
Control	Measuring resident in Leonardo software

Set up your M series