
# M series

## PILOT SCALE
## STANDARD
## STERILIZABLE IN PLACE
## SOLUTION

SOLARIS
BIOTECH SOLUTIONS

# STANDARD STERILIZABLE IN PLACE SOLUTIONS


# 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)

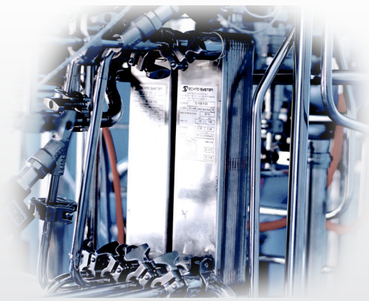
19'' coloured touch screen industrial HMI
Leonardo 3.0: smart controller designed to provide an high level of automated management of the fermentation/ cultivation processes
**Customizable PID** or factory default

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

Selectable number and type of peristaltic pumps

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

N.2 heat exchangers and recirculating pump



**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.

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.

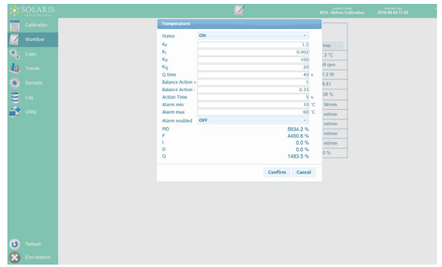
Separate drains
cooling return,condense to waste,hot condense return

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.



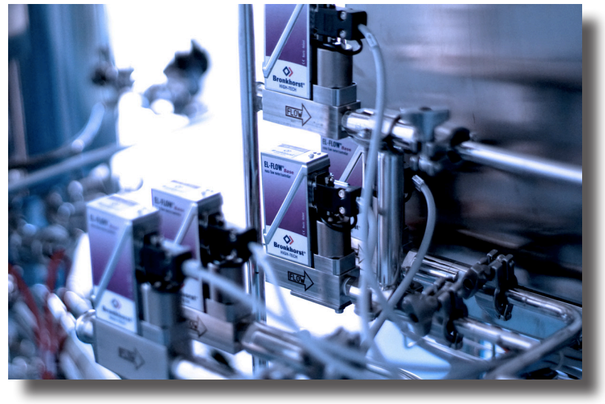
**Sensor life traceability**

**Reducing** background noise

# Gas mixing

Hardware and software adaptability are key to enable the best aeration strategy for each process. Thermal mass flow controllers (TMFC) allow precise flow rate control of individual gasses. Up to 5 TMFC's can be configured within each PCS cube and integrated to the controlling software. The powerful software and control platform allows precise cascade adjustment of 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

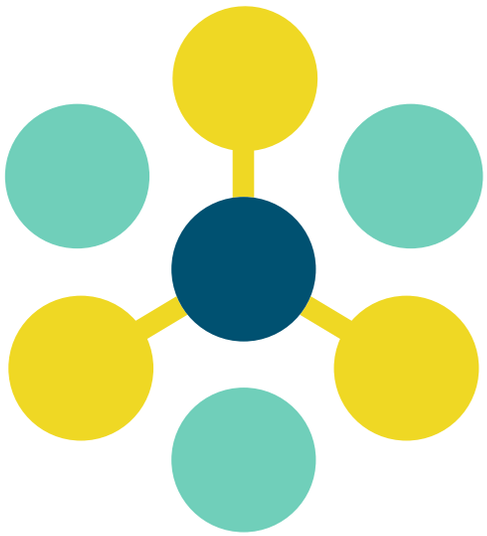
| | |
|---|---|
| Sensor | n.3 load cells |
| Control | Measuring resident in Leonardo software |

## Antifoam/Level

| | |
|---|---|
| Sensor | Solaris sensor |
| Control | Measuring resident in Leonardo software |

## Set up your M series



# SOLARIS

BIOTECH SOLUTIONS

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