Kronos

AUTOMATIC AND FLEXIBLE TANGENTIAL FLOW FILTRATION SYSTEM

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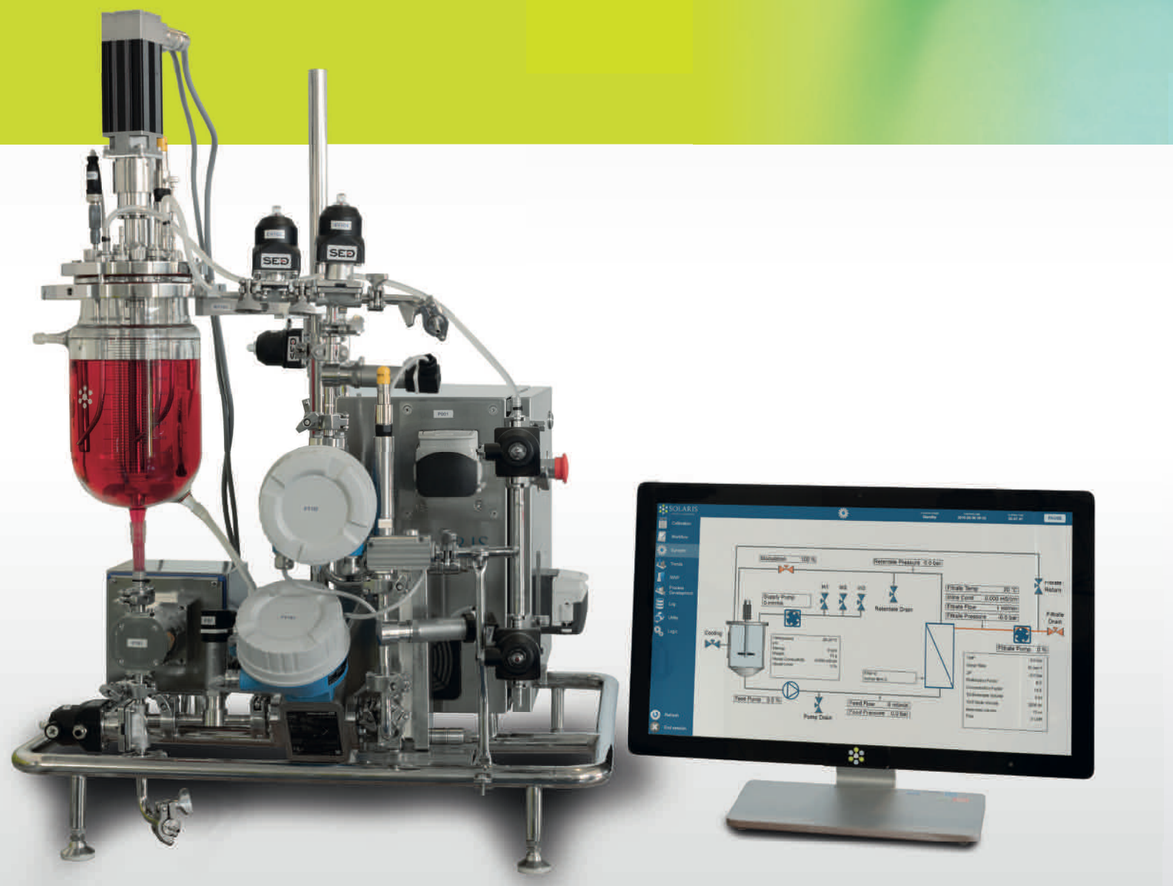

KRONOS is a standalone, benchtop, automatic Tangential Flow Filtration (TFF) system offering up to 0.5 m2 total filtration area. Utilizing state of the art componentry, the system is equipped with powerful software enabling automatic process sequences, and innovative process development modules.

Typical applications includes the following:
Basic research
Scale-up and scale-down studies
Process development and optimization

KRONOS can be used for:
Biopharmaceutical
Biofuels research and manufacturing
Vaccines
Food and beverage biotechnologies
Bioremediation
Bioplastics
Cosmeceutical
Nutraceutical

Flexibility
the best membrane for each separation process

OPTIMIZING
The ratio cost/profit

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KRONOS

Benefits

Availabe in 3 different volumes:
2L, 5L, 10L.
Removable vessel

Powerful/ 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

Modbus Digital Hamilton sensors

Fully removable and cleanable jacket

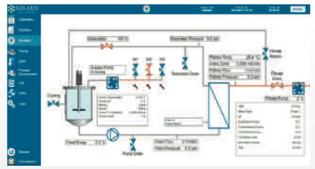
Small foot print to maximize lab space efficiency

Integrated NPW test

Automatic process sequence
Fiiltrate flow control

Flexibility
the best membrane for each separation process

User-friendly process management
Innovative filter history management



Safety: pressure releaf valve included in each unit

Remote access via PC, tablet/smartphone
Remote control for after sale assistance

Flexibility

Kronos can be equipped with various membrane types (hollow fiber, cassettes, ceramic) and is designed following the criteria of cGMP.

The included PLC based controller provides all functionality for parameter measurement and process control. The hardware layout is designed such that sensors, pumps, recirculation vessels, valves, etc., are conveniently located for operation and turn-around.

Solaris can assist in evaluating the best membrane for each application in terms of material, geometrical configuration, and working parameters to:

- minimize shear
- avoid the "gel" layer problem
- increase diafiltration efficiency

Flexibility
the best membrane for each separation

Modbus Digital sensors

Why a digital sensor?

Digital sensors has been integrated to the Solaris PCS and 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 calibrations/batch calibrations and more.

Sensor life traceability

Reducing
background noise

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Data sheet

Kronos 0.5			
Total Volume (liters)	2,00	5,00	10,00
Hold up volume		70 ml	
Pump output		4-180 l/h	
Max. operating pressure		4 bar (g)	
Membranes available		Cassettes, Hollow fiber, Spiral wound, Ceramic	

Vessel Data	
Design	Borosilicate Glass Vessel with conical bottom
Materials	Vessel: Borosilicate Glass Lid: AISI 316L
Drive	Brushless Motor Direct Assembly
RPM	1-2600 RPM, Accuracy 1RPM
Impeller	Marine impeller
Weight	Load cell

PCS and Software

PCS	S.S Cabinet AISI 304
HMI	23'' Touch screen
Software	SCADA Solaris Software Control **Galileo**
Data Extraction	Through USB port or Ethernet
Graph trends, On line displaying and Printing	
On line parameter calibration	
Alarms Management	
Event recording	
Multipasswords level	
Integrated NPW test	

Options

Tranfer module	
Supply pump	Peristaltic pump. For diafiltration and large volume ultrafiltration.
Triple inlet valve	Automated valves for highly automated filtration process

Permeate module	
Filtrate pressure flow control pump Included flow meter	Prevent membrane fouling in microfiltration
pH measurement	Inline pH sensor
Conductivity measurement	Inline conductivity sensor
UV 280nm measurement	Inline UV prevent low yield or yield loss

Vessel upgrade options	
pH measurement	
Weight measurement throught load cell	
Conductivity measurement	
Temperature measurement	
Level control via Sensor	Extra safety during manual operation

Holder option	
Hollow fiber holder	For single hollow fiber cartridge
Manifold for 3 hollow fiber cartridges	
Cassette holder	From various manufacturers

Chiller

- Optionally KRONOS can be equipped with a chiller for heat removal from your culture minimizing lab water usage
- Using this system you don't need a water supply line in your lab
- Cost-effective cooling of fermenters
- Easy operation
- Refregerant level monitoring

Chiller data sheet	
Working temperature range	-10°C / +40°C
Temperature stability	±0.5
Power consumption	0.7 kW
Filling volume range	2-8 L
Cooling output at 20°C measured with ethanol	0.25-0.60 kW
Cooling output at 10°C measured with ethanol	0.20-0.50 kW
Cooling output at 0°C measured with ethanol	0.15-0.36 kW
Cooling output at -10°C measured with ethanol	0.09-0.15 kW
Pump pressure max.	0.35-1.30 bar
Pump flow max.	16-35 L/min.
Dimensions (WxDxH)	200x350x465 mm

Solaris offers expertise in scale-up pilot and industrial scale TFF applications. Tytan series tangential flow filtration systems are tailored to each application by:

- utilizing the optimal membrane material
- optimizing flow path dimensions
- utilizing the best components and controlling parameters for each process

Solaris' approach to TFF technology aims to be in lock step with each customer's cost/profit analysis.

TYTAN series

TYTAN 100
Micro/ Ultrafiltration Unit
Equipped with ceramic tubular membranes

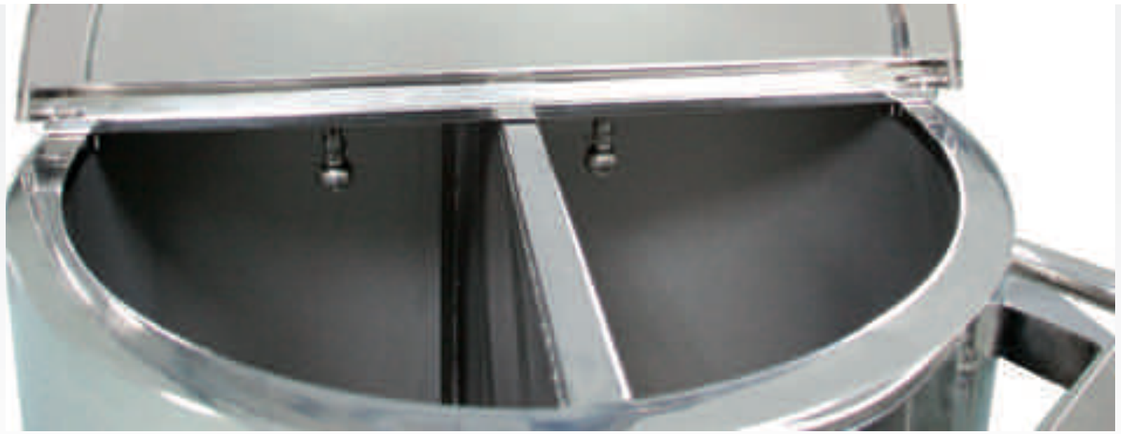
TYTAN 500
Microfiltration Unit

The **TYTAN series** is based on Microfiltration and Ultrafiltration techniques and operates in the low pressure range of 1-5 bar.

Available membranes:

- spiral wound
- hollow fiber
- cassettes
- tubular ceramic

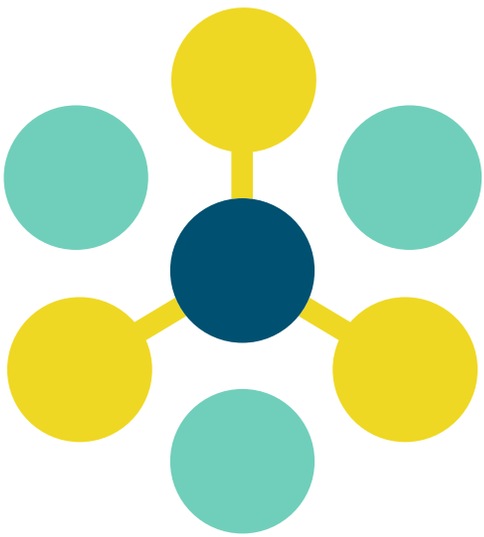
C.I.P. & S.I.P. SYSTEMS



Solaris manufactures C.I.P. / S.I.P. SYSTEMS for repeatable processes under the strong hygienic regulations demanded by the pharmaceutical, biotechnology, food, diary and beverage industries.

Single or Multi-tank configurations are available; multi tank configurations offer independent vessels for water of different quality, like deionized water (DI), hot or cold water for injection (WFI), reverse osmosis water (RO), etc. Cyclical controller and software sequences are available (e.g. wash down rinse, acid wash, alkaline wash, wash down, final wash). Systems are capable of fully automatic or manual operations.

Processes are managed via PLC based controller, integrated to the CIP/SIP unit. The touch screen HMI is utilized for setting up: task sequencing/repetition, process volumes (water, WFI, etc.), detergent dosages, CIP fluid temperature, wash pressure, purging (drainage of equipment and CIP/SIP unit with compressed air), etc.



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