

# System Flexibility

CelliGen 510 benchtop SIP bioreactor system

# Convenience, Flexibility, and Control

The CelliGen 510 bioreactor systems is designed for rapid delivery and easy field customization, should your requirements change. Compact, versatile, and exceptionally capable. Quality at a very competitive price.

## Modular design provides system flexibility

- > Easily add or remove system components at any time, pre- or post-delivery to accommodate changes in your process requirements
- > Numerous ports in the vessel headplate and sidewall provide flexibility to position sensors, spray balls, addition valves, pressure transducer and more
- > Multiple gas flow options; choose up to four thermal mass flow controllers for process gasses; an additional TMFC can be added for gas overlay/air wash system
- > Capable of batch, fed-batch and perfusion modes
- > Multiple impeller options
- > Optional SCADA software, validation packages, sprayballs for vessel clean-in-place, redundant pH/DO sensors

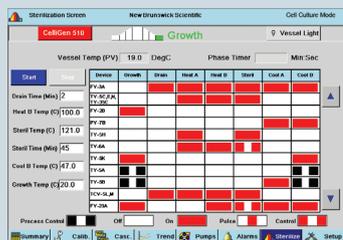
## Advanced controller optimizes results

- > Simultaneously regulate up to 32 process loops using our sophisticated RPC (Reactor Process Controller)
- > Front-accessed, analog inputs and outputs allow you to integrate up to 14 sensors, analyzers, flow controllers or other external devices

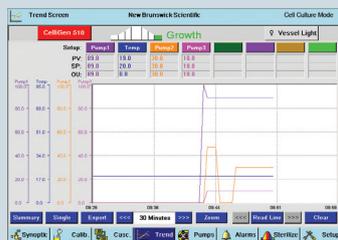
- > Security, built into the control system, offers two user groups unique userdefined passwords and auto log-out
- > Touchscreen control screens are exceptionally easy to navigate to simplify setup, calibration, sterilization and monitoring
- > Store up to ten batch recipes; program and monitor sterilization cycles, gas flow, PI values, and more

## Production-scale system that fits on the bench

- > At just 116 cm wide x 86 cm deep (45.5 x 34.0 in), the compact CelliGen 510 can fit on a lab bench; or move and operate it on our sturdy, optional, stainless-steel mobile table
- > Sterile vessel connections, flush with the vessel's interior, virtually eliminate deadlegs, minimizing contamination risk and simplifying cleaning
- > Fully validatable, following V-Model guides for URS, FRS, DDS, IQ, OQ and trace matrix
- > CE-certified and manufactured to meet cGMP guidelines



Enter and view sterilization parameters and valve sequences from the sterilization screen



Trend graphs make it simple to track and export data on up to eight process variables over a six day span

Variable	PV	Sp	SV	Control Mode	Units	Source
DO	0.0	20.0	0.0	Off	%DO	Source
Volume	0.00	0.00	0.0	Off	L	None
pH	10.00	7.00	0.0	Off	pH	None
DO2	1.0	0.0	0.0	Off	%DO	None
Air (1)	0.0	0.0	0.0	Off	%	None
O2 (2)	0.0	0.0	0.0	Off	%	DO
CO2 (3)	-0.01	0.00	0.0	Off	SLPM	Source
HF (4)	0.0	0.0	0.0	Off	%	None

Simultaneously view up to 10 setpoints, current values, cascade loops and more on the Summary screen

Cascade From	To	Enable	Start Sequence	@ 50 Start Out	End Sequence	@ 50 End Out
DO	Agit	YES	50	0.0	200	70.0
DO (2)	O2 (2)	YES	0.0	0.0	100.0	100.0
None	None	NO				
None	None	NO				
None	None	NO				

Cascade one or more variables (in this case agitation and O<sub>2</sub>) to achieve sophisticated process control, based on the value of any other one or more variables

Advanced system includes benchtop control station with touchscreen interface, stainless steel vessel, and piping skid

**Customize PI values for all process parameters** or select factory defaults

**Multiple Pg 13.5 and sanitary style connection ports** provide flexibility to position sensors and redundant sensors to meet your process needs

**Independent overlay gas/air wash system** with separate TMFC enables addition of air, O<sub>2</sub>, CO<sub>2</sub> or N<sub>2</sub> into vessel headspace

**Multiple gas flow options:** Choose 1, 3, or 4 thermal Mass Flow Controllers (TMFC) in a variety of flow ranges

**Sanitary or quick connects** allow utilities to be connected in minutes

**Built-in load cell** measures vessel volume, enabling weight to be used to automate pump control for additions and harvesting

**Optional exhaust gas condenser** reduces evaporation of vessel contents

**Resterilizable sample valve**

**Adjustable-angle, user-friendly 15 in (38 cm) touchscreen interface** simplifies control and provides clear viewing of process parameters

**Three built-in, assignable, peristaltic pumps**

**Safety features:** A sanitary rupture disk in the vessel and an ASME safety release valve on the drain jacket are standard

**ASME and CE certified:** Designed and built to ASME and CE standards

**Resterilizable drain valve** enables sterile transfer of vessel contents



**Optional glycol heat exchanger** enables rapid cool-down; closed-loop, eco-friendly design reduces need for single-pass cooling water through the system



**Resterilizable addition valve array:** Each vessel can accommodate up to four addition ports for vessel additions (one addition port shown)



**Specialized impellers maximize yields:**  
**1. Spin filter** with impeller for suspension or ADP cells in perfusion; **2. Cell-lift impeller** for low shear and high oxygenation in micro-carrier and suspension cultures; **3. Pitched blade impeller** for high aeration and low shear in insect and other cell cultures; **4. Marine impeller** for the growth of insect cells and other cultures



**Packed-bed impeller** optimizes yields of secreted products; basket is filled with Fibra-Cel® disks and used with a patented low shear draft tube impeller

**CelliGen 510 bioreactor specifications\***

<b>Vessel</b>	Working volume	10.75 - 32.0 L		
	Total volume	40 L		
	Construction	> Aspect ratio: 2:1 > Material of construction: 316L stainless steel > Vessel access: Headplate	> Code ratings: ASME/CE > Vessel pressure: 40 PSIG (5.5 BAR), Full vacuum > Finish: 15 CLA (0.38 micrometer) Ra electropolished interior [standard]	
	Agitation/speed	Top drive, double-mechanical seal standard. 25 - 200 rpm Optional: Top magnetic drive. 25 - 130 rpm		
	Impeller systems	Choice of pitched blade, marine, packed-bed/basket, cell-lift and spin filter		
	Baffles	Optional: (4) Removable, 316L stainless steel baffles		
<b>Ports</b>	Headplate	> (4) Pg 13.5 [light, Level 1 sensor/spare, Level 2 sensor/spare, septum/spare] > (4) 1.5 in NBS connect sanitary style [pressure transducer/spare, exhaust, and (2) spray balls/septums/spares]		
	Upper side wall	> (7) 1.5 in NBS connect sanitary style [gas air wash/spare, gas overlay/spare, vessel rupture device, and (4) addition valves/spares] > (1) 3 in NBS connect sanitary style [vessel sight glass]		
	Lower side wall	> (7) 1.5 in NBS connect sanitary style [RTD, sample/spare, pressure gauge/spare, sparger/spare, and (3) DO/pH/redox or combinations thereof]		
	Bottom	(1) 1.5 in NBS connect sanitary style [radial diaphragm drain valve]		
<b>Controller</b>	Control station	Controls one vessel with 32 control loops. Stores 10 recipes and eight process variables for trend graphing. Includes an industrial touchscreen monitor/user interface, three built-in pumps, and connections for all utilities and communication signals		
	Touchscreen interface/display	38 cm (15 in) Industrial touchscreen interface/display		
<b>Pumps</b>	Standard, options, and control	Standard: Three built-in, assignable, peristaltic pumps. Control modes: Off, Prime, Base, Acid, Foam, Level 2 Wet, Level 2 Dry, Volume Add, Volume Harvest Optional: Two external variable-speed pumps can be added		
	Speed	Pumps 1, 2 and 3: 100 rpm Fixed-speed duty cycle, ability to view total pump flow rates		
<b>Piping skid</b>	Construction	> Material of construction: 316L stainless steel	> Gaskets/O-Rings: Class (VI) EPDM and silicon	
	Aeration	Standard: 1 thermal mass flow controller (TMFC) with built in four-gas control (4 solenoid valves). Includes a stainless steel housing and 0.2 $\mu$ absolute filter element Optional: 3rd or 4th TMFCs for individual gas control		
	Gas overlay	Overlay with TMFC is provided with a stainless-steel housing and 0.2 $\mu$ absolute filter element		
	Exhaust line	Standard: Line designed for minimal backpressure. Includes heater and 0.2 $\mu$ absolute exhaust filter and housing, with manual backpressure regulator Optional: Automatic backpressure control		
	Temperature control line	> All systems come with automatic sterilization program > Operating temperature control range 10 °C above water supply temperature to 80 °C > Line designed to achieve 1 °C/minute temperature rises, in the 30 °C - 50 °C range > Optional: Glycol/chiller heat exchanger designed to remove 100 watts/L		
	Load cell	Provided for measuring vessel volume		
	<b>Sensor</b>	Options	> pH/DO sensor kits	> Redundant pH/DO sensor kits
<b>Dimensions (W x D x H)</b>	116 x 86 x 151 cm (45.5 x 34.0 x 59.5 in)			
<b>Additional options</b>	> Spray balls	> Foam/level kits	> Turbidity sensor/transmitter	> Decanter
	> Transfer lines	> Sterile sampling kit	> Addition vessels	> Mobile table
	> 1 or 7 port septum	> Utility prefilter/regulator kit	> Scales for addition vessel	
	> Validation packages	> Addition valve connector kit		
<b>Utility requirements and connections</b>	Process air/gases	Direct sparge: 30 PSIG (2.1 bar), 32 SLPM** Cell-lift impeller systems: 30 PSIG (2.1 bar), 15 SLPM Overlay options: 32 SLPM		
	Instrument air	80-100 PSIG (5.5 - 6.9 bar), 2 scfm (56.5 SLPM)		
	Process steam	35 PSIG (2.4 bar), 10 lb/hr (4.5 kg/hr)		
	Utility steam	35 PSIG (2.4 bar), 35 lb/hr (15.9 kg/hr)		
	Facility water	30 PSIG (2.1 bar), 1 GPM (3.79 L/min)		
	Water return	Less than 15 PSIG (1.0 bar) back pressure		
	Clean condensate	Gravity drain		
	Biowaste	Gravity drain		
	Glycol/chiller	30 PSIG (2.1 bar), 2 GPM (7.57 L/min)		
	Electric	208-230 V AC, single phase, 50/60 Hz, 15 A		

Eppendorf is ISO 13485 and 9001 certified. \* Specifications subject to change without notice.  
\*\* Flow rates shown are for use with a single TMFC with 4 solenoid valves. Other options available.  
Ask your Eppendorf representative for details.

Your local distributor: [www.eppendorf.com/contact](http://www.eppendorf.com/contact)  
Eppendorf SE · Barkhausenweg 1 · 22339 Hamburg · Germany  
[eppendorf@eppendorf.com](mailto:eppendorf@eppendorf.com)

<b>Input/output connections and communications ports</b>	External devices	Seven analog inputs and seven analog outputs for your external devices such as analyzers, sensors, external pumps, etc. (Reduce by 1 input and output for each additional TMFC added)
	2 USB ports	Import firmware/software upgrades and export trend data. Connect an optional 8-port serial box for accessories requiring a serial connections
	Communications port	For optional BioCommand®/SCADA software

[www.eppendorf.com/celliGen510](http://www.eppendorf.com/celliGen510)