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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 continuous 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) or Allen-Bradley® CompactLogix™ PLC (Programmable Logic 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
> This same RPC controller is used on our other benchtop bioreactors, facilitating scale-up and scale-down

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
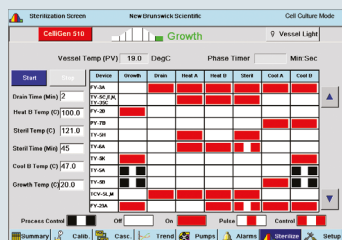
Enter and view sterilization parameters and valve sequences from the sterilization screen
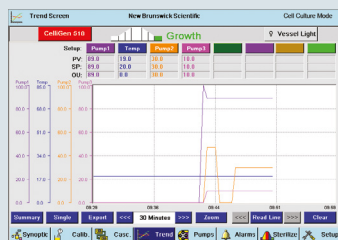
Trend graphs make it simple to track and export data on up to eight process variables over a six day span

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

Cascade one or more variables (in this case agitation and O_2) 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_2, CO_2 or N_2 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
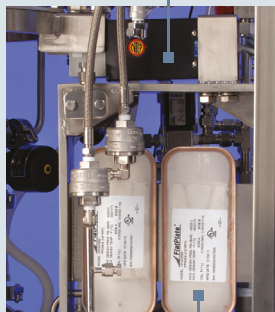
Resterilizable sample valve

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

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CelliGen® 510 bioreactor specifications*

Vessel	Working volume	10.75 - 32.0 L
	Total volume	40 L
	Construction	> Aspect ratio: 2:1 > Code ratings: ASME/CE > Material of construction: 316L stainless steel > Vessel pressure: 40 PSIG (5.5 BAR), Full vacuum > Vessel access: Headplate > 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
Ports	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]
Controller	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
Pumps	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
Piping skid	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 μ 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 μ absolute filter element
	Exhaust line	Standard: Line designed for minimal backpressure. Includes heater and 0.2 μ 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
Sensor	Options	> pH/DO sensor kits > Redundant pH/DO sensor kits > Redox sensor kit
Dimensions (W x D x H)		116 x 86 x 151 cm (45.5 x 34.0 x 59.5 in)
Additional options		> 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 > Mobile headplate lift > Validation packages > Addition valve connector kit > Scales for addition vessel
Utility requirements and connections	Process air/gases O_2, N_2, CO_2	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.

Input/output connections and communications ports	External devices (RPC only)	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
Regulatory compliance	c(ETL)us CE ASME	CAN/CSA-C22.2 No. 61010-1 UL Standard UL-61010-1

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