



### CellMax® Cell expansion

*is superior to all cell culture systems... except one... ...The Human Capillary System !*

Of all in vitro cell culture technologies, nothing comes closer of an ideal in vivo growth conditions than CellMax®. CellMax® is a unique artificial capillary system designed expressly for the successful culture of a variety of cell types, from bone marrow to hybridomas. Unlike conventional cell culture technologies such as flasks or roller bottles, CellMax® simulates the highly efficient, three-dimensional function of the human capillary system, thus yielding exceptional dense harvests of viable cells and cell products. And, unlike other bioreactor and hollow fiber technologies, CellMax® Quad System can simultaneously operate up to four independent cultures at different flow rates. It requires far less space, manipulation and materials than standard culture technologies.

The CellMax® artificial capillary cell culture system features :

- ◆ The proprietary CellMax positive pressure displacement pump system that can generate high culture medium flow rates without the use of a peristaltic pump.
- ◆ The unique CellMax® artificial capillaries modules that thrive on and around a large surface provided by a network of microfibers.

Cells remain in the extra-capillary space during culture benefiting from continuous oxygen and nutrient supply of the medium that is perfused inside semi permeable microfibers, while it is protected from the shear of the rapidly circulating medium.

#### Advantages of Artificial Capillary Cartridges

- ◆ Metabolic waste and inhibitory factors (TGFbeta, TNFalpha) are dialyzed away from the cells
- ◆ Autocrine and conditioning factors (oxygen, CO2 and nutrients) concentrate around the cells reducing serum requirements
- ◆ pH of growth medium is stable and physiological
- ◆ Tremendous surface area for cell attachment and provision of oxygen and nutrients
- ◆ Secreted products (protein, antibodies) concentrated in the small volume (10 ml to 60 ml) extra capillary space (ECS)
- ◆ Large cell numbers (up to  $5 \times 10^{10}$ ) can be conveniently handled
- ◆ Endotoxin load reduced
- ◆ Cells can be cultured for over 6 months
- ◆ Closed system allows safer handling of pathogenic cultures

As a result, cells benefit from ideal conditions allowing **long-term culture** (up 6 months) in stable microenvironment (miming tissue/organ) to reach **high density** (confluent and alive cells). The system is **greatly cost-effective** (small investment / serum economy / reduced maintenance)

#### Disadvantages of conventional cell culture devices

- ◆ Cells grow on non-porous plastic surface in 2-dimensions
- ◆ Cells grow in their own metabolic waste
- ◆ Autocrine and conditioning factors are lost when cells are fed
- ◆ pH of growth medium can become very acidic - this is non-physiological
- ◆ "Feast or Famine" conditions for the cells
- ◆ Labor intensive

#### Disadvantages of conventional bioreactors

- ◆ Expensive systems and costly in serum and maintenance
- ◆ Peristaltic pumps can cause particulates to shed from the wall of the pump tubing, clogging of fibers pores and shortening cartridge life.

### Selection guide

	Cost Effective & Practical	Closed & Safe	Physiologic	Integrated Systems	No. Required
<b>CellMax®</b>	Yes	Yes	Yes	Yes	1 flexible
<b>Bags</b>	No	Limited	No	No	2 to 200
<b>Flasks</b>	No	No	Limited	No	100 to 1400
<b>Roller Bottles</b>	No	No	No	No	20 to 50
<b>Bioreactors</b>	+ / -	Yes	Limited	Yes	1

### Single station CellMax

The **single station CellMax** features three flow rates and takes up about the same area in an incubator as a T225 flask. The system comes complete with all components required to operate one independent culture module. Elegantly simple in design and functions the system permits the culture of up to  $5 \times 10^9$  cells per module and produce 5 to 50 mg of monoclonal antibody per harvest. The cartridge #BA1190 (CE, 201µM OD, 50KD MWCO) is ideal for Ab production

#### Economical

- ◆ Operates within a standard CO<sub>2</sub> incubator
- ◆ Compact design minimizes space
- ◆ Disposable artificial capillary modules are pre-assembled and ready for cell culture

#### Practical

- ◆ Accommodates standard-size media bottles
- ◆ Adjustable flow rate
- ◆ Quick pump disconnect for easy transfer of cultures

#### Reliable

- ◆ Efficient pump design ensures long culture life
- ◆ Cool-running motor does not interfere with incubator temperature control
- ◆ Experienced scientific staff ensures superior service and technical support

CELLMAX® System includes adjustable flow rate pump station, power supply, reservoir cap and accessories

Description	Cat.#	Qty
Cellmax system with 33 mm Module to fit Round Glass bottles	<b>R46891</b>	1 unit
Cellmax system with 58 mm Module to fit Square Plastic bottles	<b>R46892</b>	1 unit

\*for upgrade kit and bigger system, see below.

# Cell Biology - Culture

## Cell Expansion



### Bigger systems

The **CellMax® QUAD Cell Culture System** is a unique very flexible system designed for the simultaneous culture of different cell lines (expressly mammalian cell types), for repetitive studies of culture conditions of a single cell type, and for flexible adjustment of production scale-up. The CellMax Quad has 12 precisely controlled flow rates. The wide range of available flow rates is especially useful for endothelial cell studies under conditions of defined shear stress. The system comes complete with all components to simultaneously operate up to four separate, independent culture modules.

The **CellMax® HF QUAD Cell Culture System** is similar to QUAD system, but modified with pump that doubles flow rate. It is intended to provide complete flexibility for the laboratory that has occasional requirements for larger scale cell culture. It can support the medium scale cartridges (R46940), and larger cartridges (R47050, R47060) in the same unit and at the same time.

The **CellMax® Bigfoot Cell Culture System** is similar to CellMax Quad system, but has double the flow rate, as well as doubling the surface for gas exchange. It simplifies operating (single shelf in a standard CO2 incubator), and daily cartridge maintenance is only 15 minutes per day. Scale-up production costs are cut off.

It can produce monoclonal antibodies in the range of 5 gram to 2 grams per month and support the growth of up to  $5 \times 10^{10}$  hybridoma, lymphocyte, recombinant 293 or CHO cells in a complete economical system.

CellMaxSystems	Cat.#	Qty
<b>BIGFOOT UPGRADE KIT</b> Includes all components required to upgrade standard CellMax to big Foot configuration : Big Foot tray, high flow pump platen adapter with high flow path, reservoir cap and accessories	<b>U37000</b>	1 unit
<b>CELLMAX® QUAD</b> Includes four position variable flow pump station, electronic flow rate control unit, four reservoir caps and accessories	<b>R46900</b>	1 unit
<b>CELLMAX® HIGH FLOW QUAD</b> Same as Cellmax Quad but with modification to double media flow rate. Includes four positions variable flow pump station, electronic flow rate control unit, four reservoir caps and accessories	<b>R46930</b>	1 unit
<b>CELLMAX® BIGFOOT</b> Includes adjustable flow rate pump station, big foot tray, high flow pump platen adapter, with high flow adapter, power supply, reservoir cap and accessories	<b>R46910</b>	1 unit

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### Cellmax cartridges

Cat. #	MicroFiber characteristics								Suitable CellMax systems			
	Material	O.D. (µm)	Wall Thickness (µm)	Luminal Area (cm²)	Outer Surface Area (cm²)	ECS Vol. (ml)	95% MWCO	50% MWCO	Classic	Quad	BigFoot	HF Quad
R46970	Cellulosic	210	15	220	250	2.2	150 kD	30 kD	Classic	Quad	BigFoot	
R46940	Cellulosic	216	8	780	847	7	20 kD	4 kD	Classic	Quad	BigFoot	HF Quad
BA1190	Cellulosic	210	15	1900	2200	12	10 kD	30 kD	Classic	Quad	BigFoot	HF Quad
R47050	Cellulosic	216	8	-	1100	50	20 kD	4 kD			BigFoot	HF Quad
R47060	Cellulosic	200	8	-	1600	98	20 kD	4 kD			BigFoot	HF Quad
R46980	Polyethylene	430	50	964	1500	12	0.3 µm		Classic	Quad	BigFoot	HF Quad
R46990	Polyethylene	430	50	108	123	2.3	0.3 µm		Classic	Quad	BigFoot	
R47000	Polyethylene coated	430	50	108	123	2.3	0.3 µm		Classic	Quad	BigFoot	
R47030	Polypropylene	630	150	70	100	1.4	0.5 µm		Classic	Quad	BigFoot	
U36760	Polypropylene coated	630	150	70	100	1.4	0.5 µm		Classic	Quad	BigFoot	
R47010	Polypropylene	630	150	327	423	7	0.5 µm		Classic	Quad	BigFoot	HF Quad
R47020	Polyethylene coated	630	150	327	423	7	0.5 µm		Classic	Quad	BigFoot	HF Quad