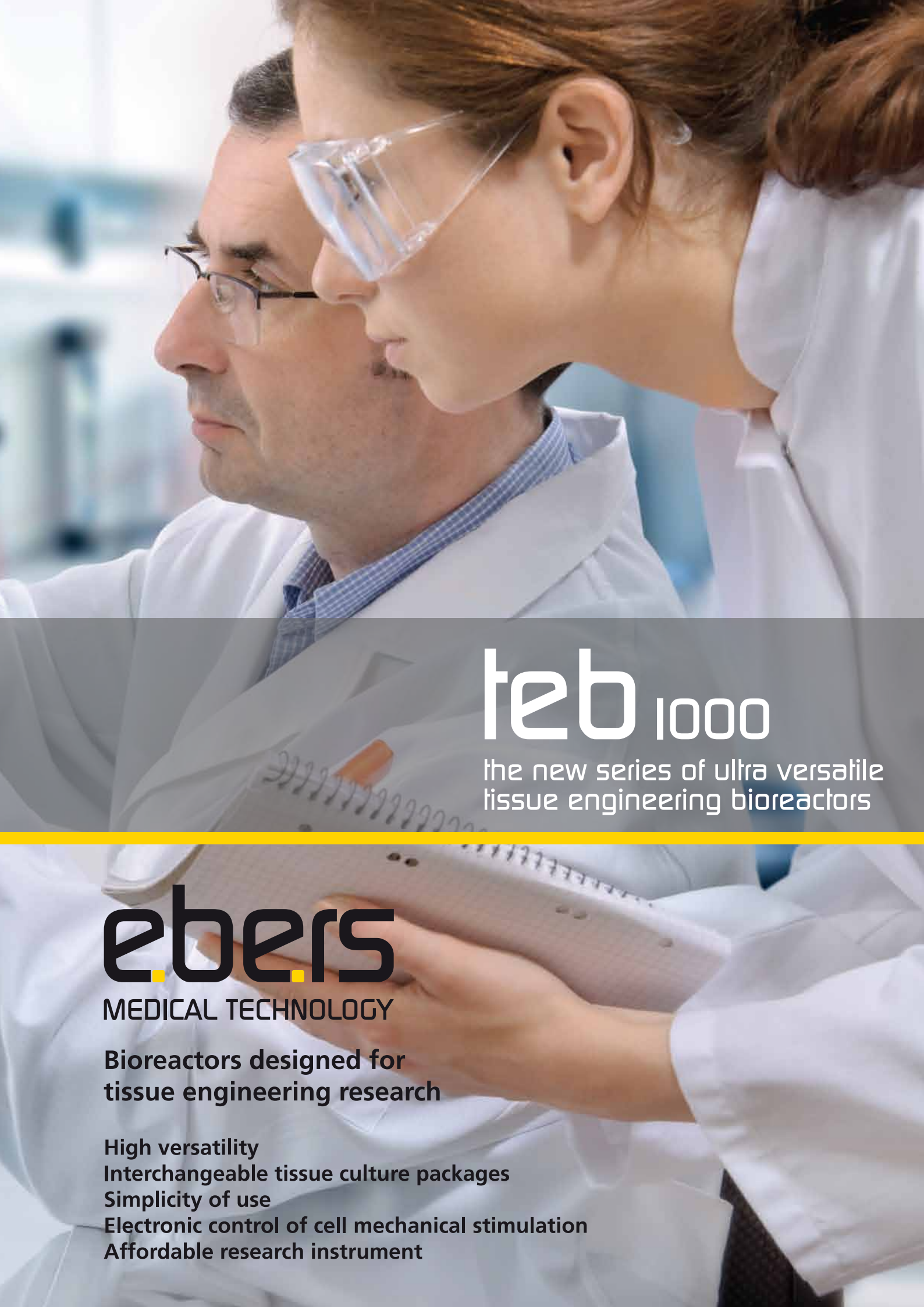


teb 1000

the new series of ultra versatile tissue engineering bioreactors

ebers

MEDICAL TECHNOLOGY

Bioreactors designed for tissue engineering research

High versatility
Interchangeable tissue culture packages
Simplicity of use
Electronic control of cell mechanical stimulation
Affordable research instrument

Tissue Engineering and the TEB1000 series of bioreactors: a natural alliance

Producing tissues in vitro requires appropriate bioreactors that simulate physiological environments for cell growth on 3D substrates. State-of-the-art tissue engineering bioreactors must not only control critical parameters for cell culture, such as temperature and pH, but also have to ensure an adequate nutrient supply within the 3D construct and mimic the in vivo mechanical stimulation through the application of physiological mechanical stimuli.

The **TEB1000 series** of bioreactors has been designed to meet the requirements of tissue engineering and regenerative medicine researchers, with three big objectives in mind: **versatility, cost-saving and simplicity of use.** Its original flexible architecture avoids having to purchase a specific bioreactor for every tissue or application of interest, thus saving significant sums of money. Furthermore, its intuitive digital touchscreen control system and the simplicity of design of the culture chambers will make you forget about the instrument and let you focus on the experiment.

Advantages

Flexibility and versatility

The modular design of the TEB1000 platform ensures endless applications and permits **to use the same Master Unit to work with an unlimited number of tissues, conditions and biomaterials**. All the Tissue Culture Packages are fully compatible with the Master Unit and are easily interchangeable. Importantly, this guarantees that your TEB bioreactor system will always be useful and fully operational, even if you repeatedly reorient your research lines in the future.

Cost Saving

The investment necessary to acquire a specific Tissue Culture Package, or to have one designed by EBERS engineers tailored to your particular needs, is small compared to the cost of the overall system. This implies that once that you have the TEB1000 Master Unit working in your lab, you will be able **to increase the range of applications of your bioreactor at a very reduced cost**, thus saving significant sums of money, now and in the future.

Furthermore, all of our products are complete systems and hence require no extra equipment (e.g., CO_2 incubator or computer) to work.

Simplicity of use

Simplicity is definitely one of our key principles: different Tissue Cultures Packages can be quickly interchanged and are built with bioinert and autoclavable materials, perfusion conditions can be easily controlled from a touchscreen and the unique architecture of the system permits to achieve higher levels of complexity from standard base configurations.

"A state-of-the-art bioreactor designed to meet the needs of academic and industrial researchers on tissue engineering and regenerative medicine."

Solved problems

Master Unit: integration of a CO2 incubator and a pumping system

In the TEB1000 series the functions of a CO2 incubator and a double peristaltic pumping system are integrated in a single Master Unit. Therefore, fewer components must be introduced in the internal chamber of the unit, reducing the risk of contamination and excessive heat generation while increasing the available useful volume.

Cell culture on 3D substrates

Growing cells in a 3D in vitro environment poses relevant problems due to the absence of a vascular supply. The TEB1000 series of bioreactor systems permits to impel a flow of medium through cell seeded scaffolds or the lumen of vessel constructs and prosthetic grafts. By doing so not only mass transport and nutrient exchange are improved, but also cells can be mechanically stimulated in a controlled manner.

Automatic control of cell mechanical stimulation

The TEB1000 series of bioreactors permits to deliver electronics controlled mechanical stimulation profiles to a wide array of constructs. The control system allows for the development of a broad range of experimental protocols of flow stimulation: different combinations of frequency, flow rate and flow profile can be easily set, providing an adequate physiological environment.

The TEB1000 series platform:
a versatile architecture with endless applications

The unique architecture of the TEB1000 series has been conceived to dramatically extend the range of applications of the equipment. Within this series, a fully operational bioreactor is composed of two elements:

A **Master Unit**, with the functionality of a CO_2 incubator, but also incorporating an integrated double peristaltic pumping system and its corresponding digital control system with touchscreen interface.

A **Tissue Culture Package**, adapted to a specific tissue or application. Each package consists of a culture chamber and a number of accessories, depending on the application. Packages are fully interchangeable so that all of them can be used with the same Master Unit.

TEB1000 Master Unit for cell culture under flow conditions.

Culture packages to be used within the Master Unit

DISPOSABLE PERFUSION CHAMBER

Designed to seed and grow cells in a 3D environment under perfusion conditions, it is well suited for the engineering of bone and cartilage.

VASCULAR PACKAGE

Flexible system that permits to impart a pulsatile flow of medium through the lumen of vessels, stents and grafts of variable length and diameter under controlled conditions.

CUSTOM PACKAGE

Your unique needs can be satisfied by custom systems developed by our experienced engineering team.

YOUR OWN SETUP!

Feel free to use your own in-house culture chamber design, taking advantage of the flow control capabilities of the Master Unit.

Culture packages

P3D Disposable Perfusion Chamber

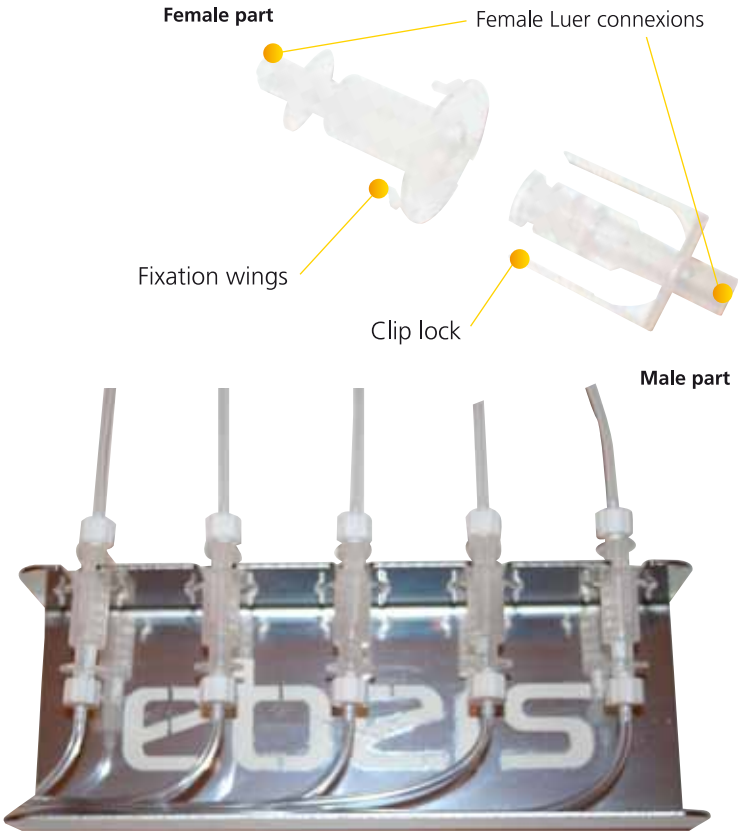
Specifically designed to grow cells on thick 3D scaffolds.

Features:

- Supplied in a sterile ready-to-use pack.
- Fully transparent.
- Minimised area in the direction perpendicular to the flow.
- Female luer connexions.
- Easy scaffold insertion and removal processes.
- Chamber fixations wings.
- Watertight closing with pull-prevention system.

CHAMBER MODEL	SCAFFOLD DIAMETER	SCAFFOLD HEIGHT
P3D-6	5 to 7 mm	1 to 13 mm
P3D-10	9 to 11 mm	1 to 13 mm

Free samples available upon request!



The chamber has been designed to hold cylinder-shaped scaffolds.

Vascular Package

This package is specifically designed for the development of tissue-engineered vessel constructs. It allows imparting two independent flows of media through the lumen and outside the construct, determining the culture conditions at the inner and outer surfaces, respectively.

Using the Master Unit, you will be able to apply pulsatile flow at cardiac frequency through the lumen, mimicking physiological conditions, while ensuring an adequate nutrient supply and waste removal by means of the external circulation.

Thanks to the design of the fixtures, EBERS reusable vascular culture chamber is designed to be used with vessels, stents and grafts of different length and diameter. Furthermore, special care has been taken to allow the simple manipulation of the sample, in order to prevent cell detachment.

Vascular packages of different sizes, adaptable to the dimensions of the scaffold or vessel being cultured.

Your own setup

Feel free to use any kind of chamber or culturing device with the TEB1000 Master Unit.

If none of the Cell Growth Packages satisfies your requirements, but you have an adequate commercial or in-house manufactured device at your disposal, you will still be able to take advantage of the advanced control and pumping capabilities of the Master Unit.

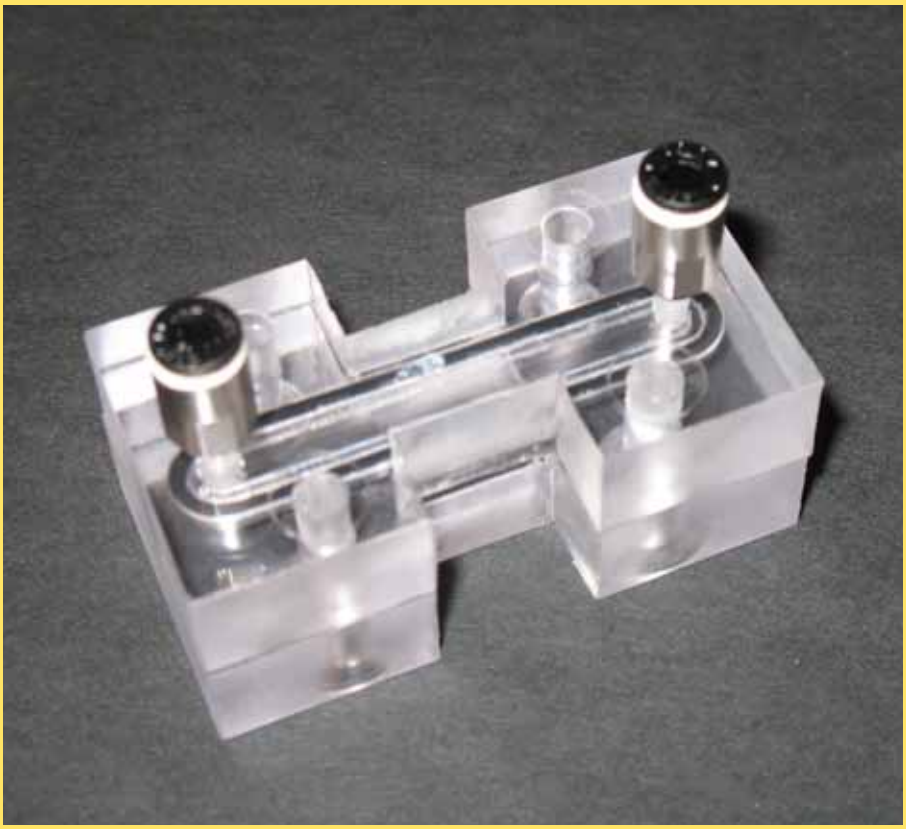
Home-made experimental set-up for tissue engineering cell culture on three-dimensional scaffolds.

Experimental set-up for cell culture on a bi-dimensional substrate under flow conditions.

Custom Package

Given the large number of different research lines existing in the tissue engineering field, it may be possible that none of the available commercial systems meets your unique needs.

In that case, our experienced technical staff will be pleased to become aware of your particular challenges and understand your ideas to provide a successful leading edge solution.



Custom developed culture chamber for culturing cells on arbitrary planar substrates.

Technical features

TEB1000

Automatic CO_2 incubator with integrated peristaltic pumping system	
General features	Double-door construction with stainless steel internal chamber Integrated double peristaltic pumping system To be used with closed cell culture systems
Internal Dimensions	540 x 451 x 693 mm
Temperature Range	4º above ambient to 50ºC
CO_2 tension range	0.2-20%
Oxygen control	Available upon request
Peristaltic pumping system	
General features	Fully integrated in the CO_2 incubator Pumpheads available on the rear wall of the internal chamber of the incubator Electric engines, electronics and power supply outside incubator Up to 20 channels, depending on the configuration
Number of pumps	2 independent pumps
Number of pumpheads	Up to 2 pumpheads per pump Two models of pumphead: HF (high flow) and LF (low flow)
Number of channels per pumphead	HF pumphead: 1 channel/pumphead LF pumphead: 5 channels/pumphead
Flow rate	HF pumphead: 0.09-400 mL min^{-1} LF pumphead: 0.003-33 mL min^{-1}
Flow Profiles	Different constant and pulsatile flow profiles Custom profiles can be easily programmed
Control system	Digital control system Intuitive interface by touchscreen
Dimensions W x D x H	686 x 803 x 848 mm
Weight	140 Kg

P3D Disposable perfusion chambers

General features	Designed to perfuse media through cell seeded scaffodls of different sizes and materials
Design	Two-piece chamber with watertight closing system and pull-prevention system. Standard female luer lock connexions.
Scaffolds/samples	Single scaffold chamber designed to hold scaffolds cylinder-shaped scaffolds: • Diameter: 5 to 7 mm (P3D-6 model), 9 to 11 mm (P3D-10 model) • Height: 1 to 13 mm high.
Sterilization	Provided in sterile single-use packs

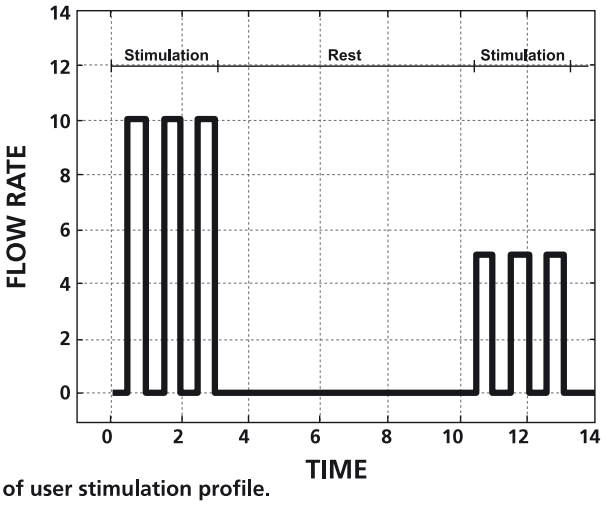
Vascular culture chamber

General features	Designed to apply a pulsatile medium flow through the lumen of vessels
Design	Easily adaptable to different vessel lengths and diameters Ports permit to circulate media through the lumen and outside the vessel through 2 independent circuits
Scaffolds/samples	Wide variety of samples/scaffolds can be accommodated Up to 60mm length, depending on the material
Sterilization	All chamber components are bioinert and can be autoclaved at 121°C, 1.1 bar

Applications:
cell culture under flow conditions

The TEB1000 series of bioreactors can be used in any experiment in which the application of flow to grow cells is recommended. Just by replacing the Tissue Culture Package, different types of cell cultures can be carried out, where a wide variety of stimuli, including per- and perifusion as well as shear flow, can be applied on cells.

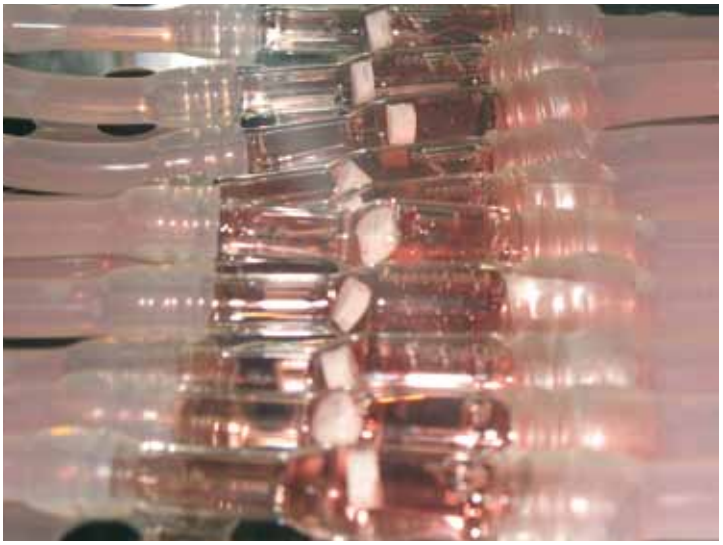
Individual chamber for cell culture under perfusion conditions on a three-dimensional scaffold.



Example of user stimulation profile.

Cell growth under flow stimulation has several advantages with respect to static culturing. The improvement of nutrient transport and waste removal are two of the most important and are a direct result of the circulation of medium through the 3D substrate.

Furthermore, impelling flow is a natural way of exerting mechanical stimuli on cells, which permits to control and direct the 3D organization of cells into tissues. Besides, physiological mechanical stimulation through perfusion of media has been shown to alter several aspects of cell function: increase in cell viability, upregulation of matrix deposition… The TEB1000 technology allows imparting pulsatile flows of varied nature (frequency, amplitude, application profile), simulating physiological environments for the growth of cells on 3D support structures.



Home-made experimental set-up for multiple simultaneous culture under perfusion on three-dimensional scaffolds.

EBERS P3D Disposable perfusion chambers.

Whether your goal is to:

- **Discover fundamental mechanisms of tissue growth and cell organization,**
- **Develop functional tissue-engineered constructs,**
- **Better understand and control cellular function and response, or**
- **Test the validity of new biomaterials,**

you will make full use of the TEB1000 series of bioreactors.

Our system can be used to grow cells:

- under **different stimulation conditions** (per- and perifusion, flow mediated shear stress, pulsatile flow…),
- on a **wide range of support structures** (artificial and natural biomaterials, prosthetic vessels, porous cylindrical scaffolds…).

EBERS,experience, innovation and quality

EBERS is a biotechnology company formed by a team of engineers, biologists and physicians with more than 15 years of experience in the field of biomedical engineering. Since its creation, EBERS is committed to the development of more user-friendly, versatile and affordable equipment designed to meet ever-increasing research goals.

The company follows a sound R+D strategy applying our expertise to develop next-generation versions of existing products and explore the feasibility of current products in new applications while creating new research and clinical equipments and systems.

From design to delivery, ensuring optimal performance and reliability is of paramount importance to our team of highly skilled and experienced engineers. Once in the lab, you will be supported by our customer service department. TEB1000 series bioreactors are supplied, as standard, with a two year warranty.

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