

# Advanced in vitro exposure systems

VITROCELL® 12/3 and 12/4 CF Stainless Steel



# VITROCELL® 12/3 and 12/4 CF Stainless Steel Exposure Module

For 3 or 4 cell culture inserts (12-well size)

The VITROCELL® 12 CF module system has been specifically designed and engineered to facilitate the research of human cell cultures in direct exposure to airborne substances such as gases, complex mixtures, nanoparticles and fibers. The system authentically simulates the conditions of human physiological exposure.

Normally two modules are required: one module for exposure to the substances and a second module for clean air control.

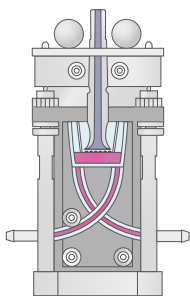
The capacity can be easily increased by adding more modules. Each module can receive a different dose concentration, so that a

complete dose/response profile is obtained in one experiment.

The cells are exposed at the air/liquid interface on 3 cell culture inserts using low flow rates of the aerosol.

After exposure, the cells are further processed to

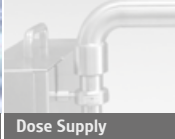
measure a wide range of endpoints, e. g. cytotoxicity, genotoxicity, proliferation, cellular and oxidative stress as well as inflammation (see also VITROCELL® assay guide).



## Culture media supply

The media is supplied to the module by gravimetric method, syringe or using a media pump for intermittent/continuous media exchange.





## Base module

This module's casing is made of electropolished stainless steel. It is designed with three or four compartments for 12-well cell culture inserts and is fully autoclavable at 121° C (250° F) for 20 min. Through the employment of a special adaptor set, this module can also be flexibly combined for use with 24-well cell culture inserts. A constant unit temperature is guaranteed using a regulated flow of temperature-controlled water through the module.

The media can be supplied individually to each well compartment. Flexible media exchange can be static, intermittent or continuous basis. This flexibility is afforded by use of a precision media pump. This module is renowned in scientific circles for its reliability and durability.

**Available adaptor set for:**

- 24-well sized inserts



**Cell culture insert (12-well size)**

## Aerosol exposure top

Special sealing and connection mechanisms guarantee a hermetic connection of the base module with the aerosol exposure top.

The aerosol inlet-stream flows through specifically shaped

inlets. They are available in stainless steel or stainless steel with unique VITROGLIDE surface treatment for lowest adhesion results. The stainless steel / VITROGLIDE inlets are specifically designed for aerosols containing nanoparticles.

The aerosol inlets are connected to the distribution or dilution systems. Extraction from the module takes place via small holes using a controlled vacuum flow. VITROCELL® calibration valves, which are connected to a vacuum pump, control flow rates effectively.

The aerosol exposure top features an in/outlet for heating the water circuit, ensuring corresponding temperatures with the base module. It is made of high-quality anodized aluminum.



## Option for 4 cell culture compartments



VITROCELL® 12/4 CF



VITROCELL® 12/4 CF base module

## Option for microbalance sensor



The VITROCELL® 12/3 and 12/4 CF modules can be equipped with microbalance sensors for dose monitoring.

## Media insert for VITROCELL® 12 series



Optional media inserts for easier cleaning.  
Media volume 2,5 ml

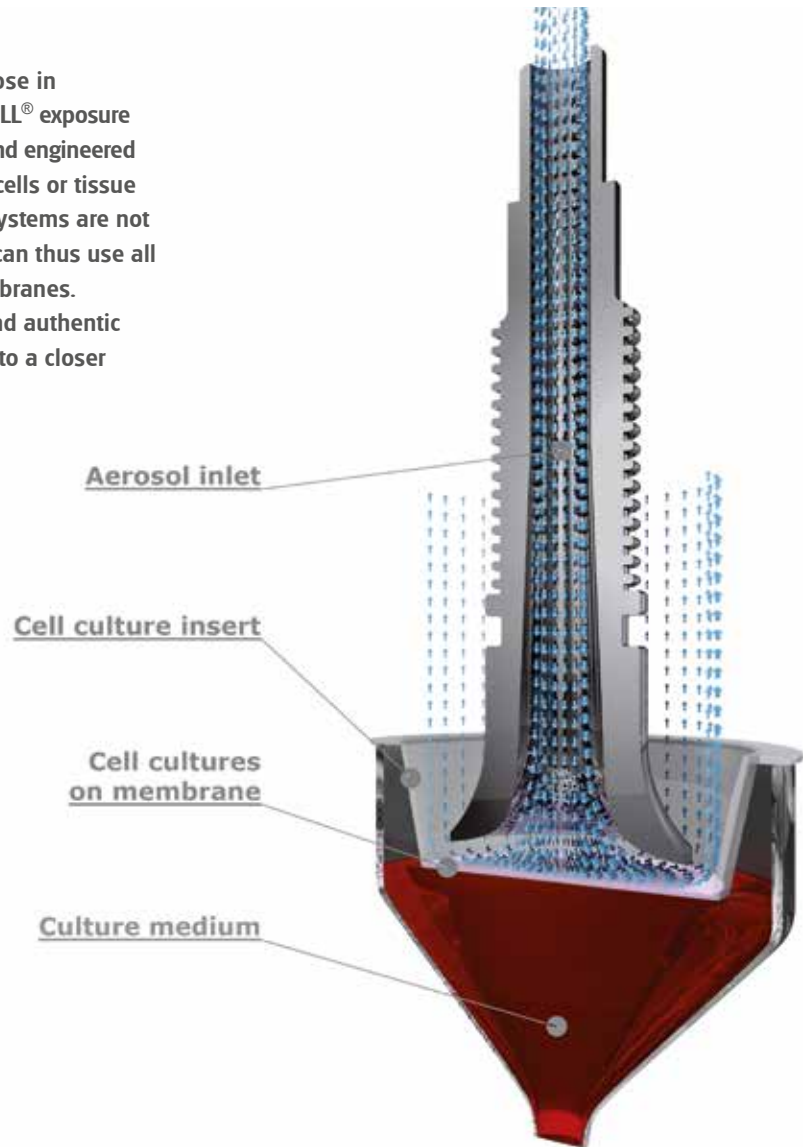
## Features

- Suitable for **COSTAR®**, **FALCON®** and **ThinCert®** 12-well sized cell culture inserts
- Autoclavability of all components
- Base module casing made of electropolished stainless steel for extreme durability
- Base module and aerosol exposure top with integrated heating circuits
- Hyperboloid geometry of inlets for optimized particle deposition and distribution
- Longer exposure cycles possible due to permanent media supply option
- Control window for monitoring culture media levels
- Option: Quartz Crystal Microbalance

# VITROCELL® Exposure Systems for Inhalation Toxicology

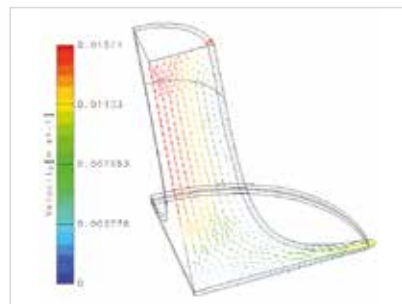
## Direct Exposure Technology at Air/Liquid Interface

In response to the scientific need to expose in physiologically relevant conditions, VITROCELL® exposure modules have been specifically designed and engineered to enable direct exposure of mammalian cells or tissue at the air/liquid interface where the cell systems are not covered with culture media. Researchers can thus use all cell types cultivated on microporous membranes. This approach allows for more credible and authentic results than by submerged exposure due to a closer replication of the human physiology.



### The advantages:

- No losses
- No dissolution
- No reaction of constituents with culture media
- High sensitivity



Optimized  
flow dynamics



## VITROCELL® EXPOSURE AT THE AIR/LIQUID INTERFACE

**Submerged Cultivation and Exposure in Incubator**

- A** Media above cells
- B** Cells on membrane
- C** Media below cells

Interaction of test components with culture media

**Low sensitivity**

**Suspension Cultivation and Exposure in Incubator**

- A** Cells in media

Interaction of test components with culture media

**Low sensitivity**

**Air / Liquid Cultivation and Exposure in Exposure Module**

- A** Direct and controlled exposure of test atmosphere to cells
- B** Cells on membrane
- C** Media below cells

No losses  
No reaction of principle components with culture media

**High sensitivity of system**

The exposure of mammalian cells or tissues to airborne substances is frequently performed under submerged conditions. In doing so, the test substances are dosed into the culture media. This procedure results in an undesired interaction of the formerly airborne substances with the media, causing limitations for authentic analysis. Therefore VITROCELL® recommends the air/liquid interface exposure technology.





## About VITROCELL®

VITROCELL® exclusively concentrates on the developing, producing, installing, training and servicing of advanced *in vitro* exposure systems.

The VITROCELL® Systems' team is driven by their vision for new in-vitro standards through state-of-the-art technology, highly qualified workmanship and absolute client dedication. VITROCELL® has successfully collaborated with clients from leading research institutes, contract research organizations, regulatory authorities or industrial laboratories across the world. Working with our team experts, all modules have been tailored to create durable and complete turnkey-systems for *in vitro* inhalation toxicology. Gases, environmental atmospheres, nano particles and complex mixtures are analyzed on lung cells at the air/liquid interface using these systems. VITROCELL® technologies are also applicable to solutions for skin research.

Over a decade of devotion to research in this specific field has given our team of design & precision manufacturing specialists the opportunity to mentor highly diversified and complex projects **from conception to completion**. We strive to become a constructive member of each research team, providing support when it is needed, advice when it is required and modules of the highest quality, which are even polished by hand before leaving here to be integrated into your workspace. Every piece of our German engineered equipment is manufactured to the highest of standards – yours.

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