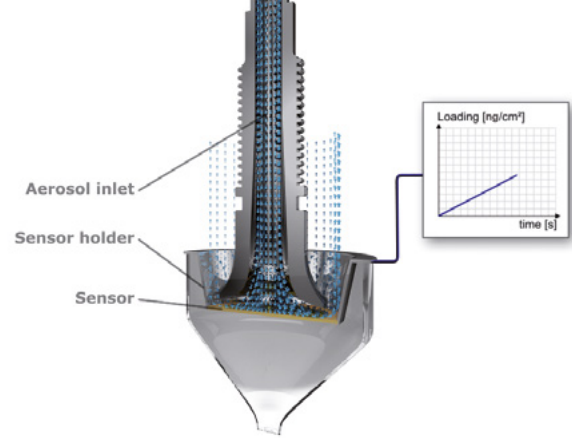


# Advanced in vitro exposure systems

VITROCELL® Microbalance Sensor and Software



# VITROCELL® QCM 6 Microbalance Sensor For Real-Time Dose Monitoring



The microbalance sensor can be fitted in all VITROCELL® installations. It is capable of measuring the deposited mass in the module at a resolution of 10 nanogram/cm<sup>2</sup> per second.

The sensors can be placed in all media compartments to validate mass deposition in the module. After validation, they may be removed so that the experiment can be carried out using the cell culture inserts. Alternatively, one microbalance sensor

can remain in the module to monitor the dose during exposure. The remaining compartments of the module are used for cell culture inserts.

VITROCELL® Microbalance Sensor – optimal for dose-response measurement.



Quartz Crystal Microbalance Sensor in Cloud Alpha MAX



VITROCELL® 6 module series with integrated microbalance sensor



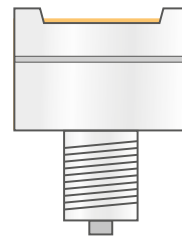
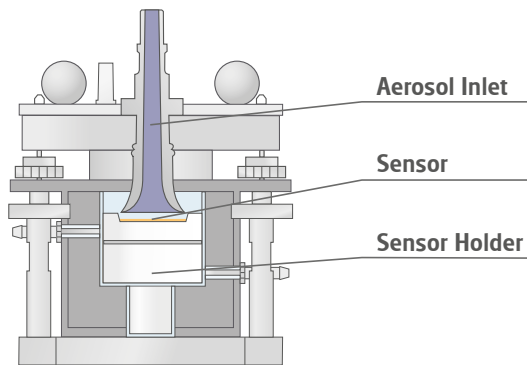
VITROCELL® AMES 4 with integrated microbalance sensor



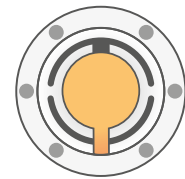
Optional microbalance sensor in 7<sup>th</sup> position of the VITROCELL® 48 PLUS

## Features

- Online measurement of particle dose in ng/cm<sup>2</sup>
- User-friendly mounting
- Fast cleaning of crystal
- Improved base line stability
- Compatible with Cloud 6, Cloud MAX, VITROCELL 6 Exposure Module Series and VITROCELL 48
- Space-saving oscillator for better handling

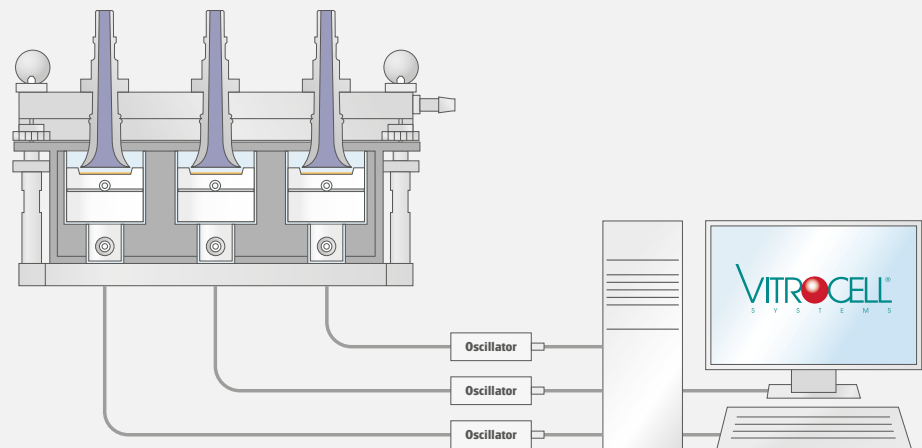


Removable Sensor Holder

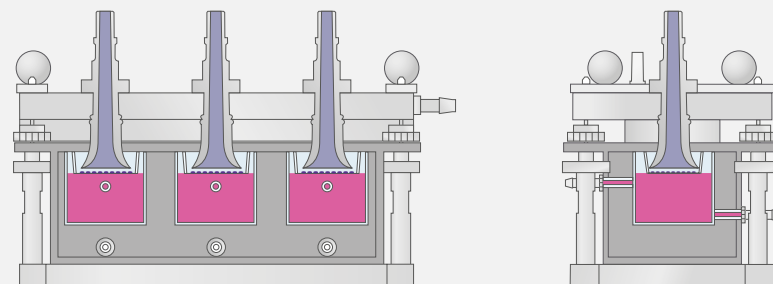


Quartz Crystal Sensor Plate

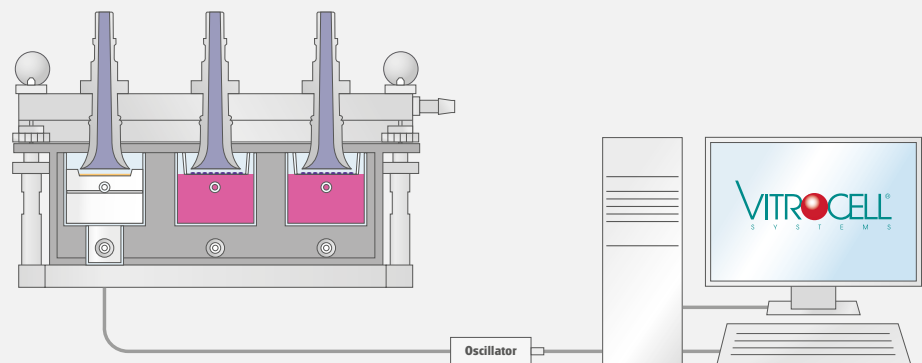
### Aerosol Process Validation



### Module Operation with Cell Cultures



### Module Operation with Cell Cultures and Online Control



# VITROCELL® sQCM 12

## Microbalance Sensor

### For Real-Time Dose Monitoring

The VITROCELL® sQCM 12 is the next step in the evolution of dosimetry methods in cell culture exposure systems. It simplifies the usage of conventional Quartz Crystal Microbalances suitable for VITROCELL® 12 modules while maintaining the working principle, precision and accuracy of the balances you're used to.

We have redesigned the entire sensor from scratch, enabling not only extremely high stability and exact measurements, but also eliminating the need for tools during service and cleaning for maximum user-friendliness.



**Designed for maximum user-friendliness.**

## Simplified use and wide compatibility

Easy crystal-replacement without tools through bayonet connection of the sensor parts.



This novel solution minimizes the time you have to spend to perform cleaning and crystal exchange: it now only takes a mere minute. Eliminating the need for screwdrivers, our new design uses a bayonet catch to connect the individual sensor parts.

In Continuous Flow Systems, results are seen online, enabling you to measure cumulated depositions starting from 170 ng/cm<sup>2</sup> reliably.

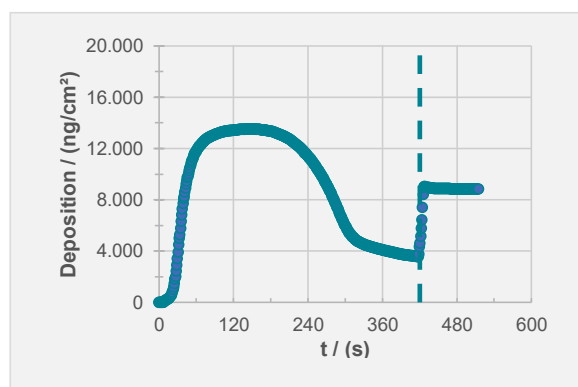
In Cloud systems, the sQCM 12 provides the additional benefit of real-time control over the process and exact readings after removal of humidity (dotted line on the right).

The innovative sensor design is fully compatible with any VITROCELL® module for 12-well sized inserts, be it Cloud, Cloud Alpha, Continuous Flow or any other VITROCELL® exposure system for this insert size.

## Use case

Thanks to the wide compatibility of the sQCM 12 sensor, it is ideal for the validation of the mass deposition of exposure substances, either during or after an experiment. Its broad measuring range and shape reminiscent of a cell-culture insert make it a convenient aid in acquiring single exposure doses or complete dose-response curves.

**VITROCELL®**  
**Cloud Alpha 12 –**  
**Exposure of 0.2 mL**  
**0.015 mg/mL**  
**Fluorescein and**  
**9.54 mg/mL KCl**





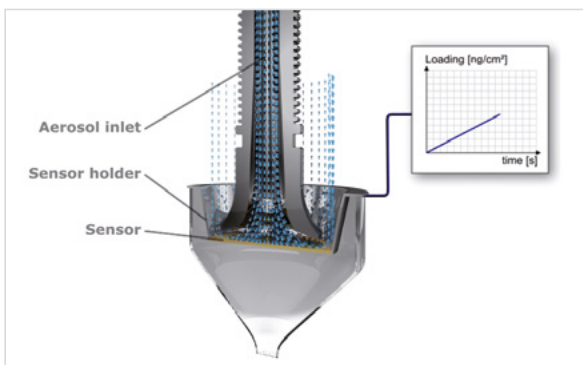
## sQCM Oscillator

To complement the handling and measurement advantages of the newly developed sensors, we paired it with a completely in-house designed oscillator. Not only is it a handy device – measuring only 3.5 cm in height, length and depth and connected via USB-C to a laptop or PC – but it is also more stable in terms of crystal oscillation and connectivity. We have gone through the experimental process of tweaking the circuitry to have less sensitivity to viscous substances and therefore improving stability during active experiments. While response e.g. during active nebulization in a Cloud exposure system is therefore a bit different, the measurements have been validated to match results of previous QCM designs.



sQCM oscillator connects the sensor and laptop/PC via USB-C.

The oscillator is compatible to the sQCM 12 sensor and ready to use with older QCM models via an adapter. A software update of the VITROCELL® Monitor Software is required.



sQCM – online measurement of particle dose in  $\text{ng}/\text{cm}^2$



sQCM mounted in VITROCELL® Cloud Alpha 12 module (left) and the new designed oscillator (right).

## Features

- Online measurement of particle dose in  $\text{ng}/\text{cm}^2$
- User-friendly mounting
- Fast quartz exchange
- Increased stability
- Improved base line stability
- Compatible with Cloud 12, Cloud Alpha 12 and VITROCELL 12 Exposure Module Series
- Space-saving oscillator for better handling



# VITROCELL® Monitor Software for Microbalances

## Standard Edition

The VITROCELL® Monitor software shows the deposition in  $\text{ng}/\text{cm}^2$  online for max. 9 microbalances. The data is logged into a .csv file which can be opened with Excel®.



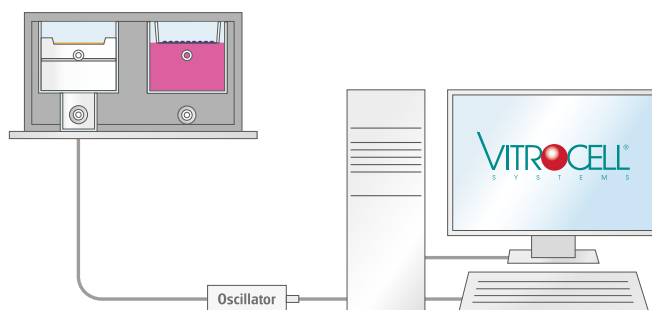
## Combined view with Photometers

With the VITROCELL® Monitor software deposition data in  $\text{ng}/\text{cm}^2$  of up to 9 microbalance sensors as well as for 9 photometers is available in a combined view.



## Microbalance Controller

The VITROCELL® Microbalance Controller is available as laptop version (for 1 sensor) or PC version (for 3, 6 or 9 sensors).





## GLP Edition

VITROCELL® Monitor software GLP Edition was developed for laboratories operating under GLP conditions. This software upgrade assures tracability to high standards.



### Key Features:

- User Management via personal USB-Dongle
- Password protection
- Auto Lock or Manual Lock function in case the operator needs to leave the workplace



### Special Administrator Features

- Admin is able to export the log file
- Admin can change the auto log off time
- Admin can unlock user dongle



### Log File

Date, time, message type, user name, source, new content, old content and comment are displayed in the reporting file to ensure a consistent documentation of every exposure.

VITROCELL MonitorVersion 1.01						
Date	Time	Type	Name	Source	Content	Old Content
18.05.2014	16:28	Message	Manu Helander	Start all	Exit channel	
18.05.2014	16:28	Message	Manu Helander	End of sampling	Sampling stopped	
18.05.2014	16:28	Message	Manu Helander	Export file	Export exported	C:\VITROCELL\Export.vxl
18.05.2014	16:28	Message	Manu Helander	Save file	Export saved	C:\VITROCELL\Export.vxl
18.05.2014	16:27	Message	Manu Helander	Sampling	Start sampling	Photocell experiment 1
18.05.2014	16:28	Message	Manu Helander	Dose introduction	Set all channels to zero	
18.05.2014	16:28	Change	Manu Helander	Concentration calibration	127	new calibration value available
18.05.2014	16:28	Message	Manu Helander	Dose introduction	Set all channels to zero	
18.05.2014	16:28	Message	Manu Helander	Dose introduction channel	Set Channel 1 to zero	
18.05.2014	16:28	Message	Manu Helander	Integration trigger level	Set Channel 1 to zero	
18.05.2014	16:28	Change	Manu Helander	User password of Manu Helander	----	Change due to offset
18.05.2014	16:24	Message	Manu Helander	Startup	VITROCELL Monitor startup	
18.05.2014	16:24	Error	Manu Helander	Startup	Wrong password	

## 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.

For more information  
please scan the QR-Code:



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