



IVTECH PRODUCTS



Introduction

IVTech offers products and know-how to improve the outcomes of your in-vitro research and refine your cell and tissue models. Using our systems, you can now implement and visualize dynamic and multi-organ in-vitro models, getting closer to the in-vivo environment. IVTech technology is based on compact, user-friendly and transparent cell culture chambers with shape and dimensions similar to the classical 24 well plate (1.5 mL/culture chamber), widely used in biological research. The main advantage of IVTech products is the possibility to simulate different tissues and image your cells in real time, maintaining the same protocols used in traditional cell culture experiments.

Figure 1 shows a few examples of in-vitro models that can be developed using IVTech cell culture chambers.

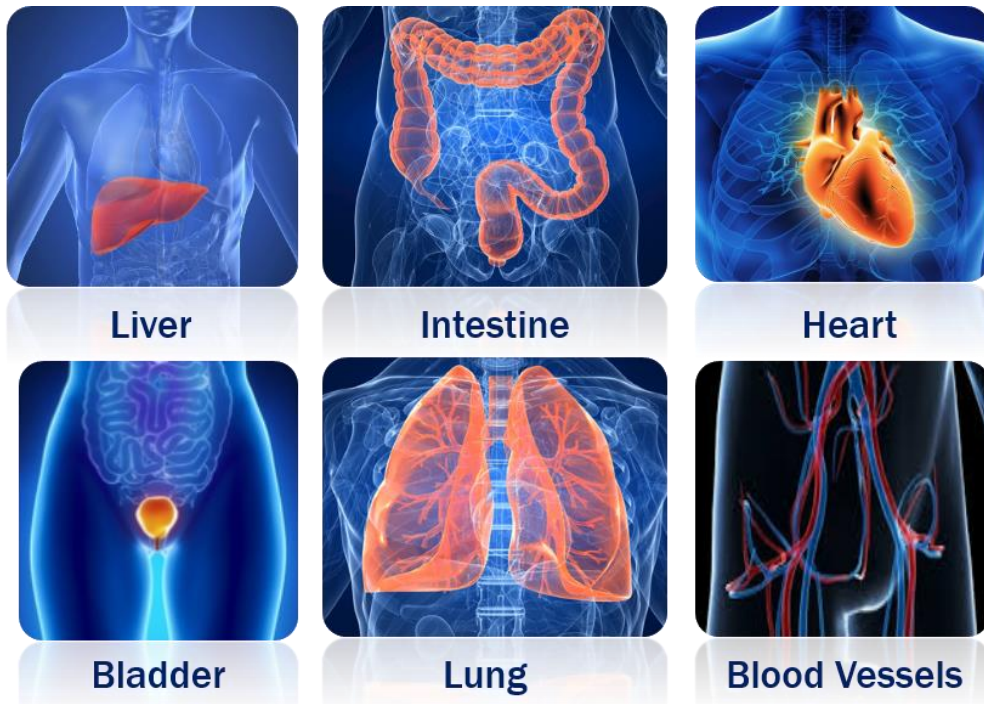


Figure 1. Few examples of in-vitro models developed using our products

Products

LiveBox1

LiveBox1 is a transparent chamber designed for inter-connected dynamic cell cultures. LiveBox1 is featured with a flow inlet and outlet for the perfusion of cell culture media. The clamp system provided with the LiveBox1 assures the watertight closure of the system in both static and dynamic conditions (up to 1 mL/min).



Wet volume [mL]	1.5
Suggested flow rate [mL/min]	0.1- 0.4

Features:

- The system is designed to reproduce the typical volume of the single well of a 24-well plate
- The **removable transparent glass bottom** allows for:
 - Live imaging during static/dynamic culture, i.e. in situ imaging of the three-dimensional culture environment using microscopy techniques.
 - Post culture imaging including staining procedures or any other sample processing. After disassembling the LiveBox1, the glass slide supporting the cell monolayer or 3D construct can be easily removed from its bottom part and used for further investigations and analysis.
- **Modularity:** LiveBox1 can be inter-connected with other cell culture chambers in order to mimic cross talk between tissues (multi-organ simulation).

LiveBox2

LiveBox2 is a transparent chamber, developed for in-vitro models of physiological barriers (e.g. lung and intestinal epithelium). LiveBox2 is designed for inter-connected dynamic cell cultures and it is equipped with two flow inlets and outlets, and a holder to house a porous membrane.

The clamp system provided with the LiveBox2 assures the watertight closure of the system in both static and dynamic conditions (up to 0.5 mL/min in apical or basal compartments)



Wet volume [mL]	1.5
Interface conditions	ALI, LLI
Suggested membrane diameter [mm]	25
Suggested membrane thickness [mm]	0.1

Features:

- The system is designed to reproduce the typical surface of a transwell insert for a 12-well plate
- The **removable transparent glass bottom** allows for:
 - Live imaging during static/dynamic culture, i.e. in situ imaging of the three-dimensional culture environment using optical microscopy.
- The **removable holder** allows for:
 - Housing of different commercial porous membranes, according with the specific cell type or tissue.
 - Easy and safe handling of the membrane where cells are seeded
 - Post culture imaging, including staining procedures or any other sample processing. After disassembling the LiveBox2, the holder system supporting the cell monolayer or 3D construct can be easily removed from the bottom part and used for further investigations and analysis.
- **Modularity:** LiveBox2 can be connected with other cell culture systems in order to mimic cross talk between tissues (multi-organ simulation).

LiveFlow

LiveFlow is a compact and low weight peristaltic pump, compatible with the incubator environment. Two removable heads drives up to two independent circuits/head. LiveFlow is equipped with a drawer able to house up to four bioreactors. Therefore you can perform up to four independent experiments in parallel. The intuitive and user-friendly interface permits a quick and easy set-up of the system, with two independent heads able to apply a flow rate between 100-450 $\mu\text{L}/\text{min}$.



Dimensions [w×l×h, cm]	21.5×16×14.5
Power supply (by provided cable)	12 V; 7.2 W
Flow rate range [$\mu\text{L}/\text{min}$]	100-450
Weight	1.2 Kg

Features:

- LiveFlow is **compatible** with the **incubator environment**
- Its **small weight** allows an **easy transfer** of the LiveFlow pump from the laminar hood to the incubator/microscope
- LiveFlow is equipped with **two pumping heads**, each one driving **two independent circuits**
- Each pumping head is **removable, sterilisable** and **reusable**
- LiveFlow is **equipped with a drawer** that houses up to four LiveBox. The design allows chambers monitoring using an inverted microscope
- The **interface is intuitive** and **user friendly**:
 - A couple of buttons allows an easy setting of flow rates
 - A display shows the flow rate selected for each head
 - Flow direction can be reverted through a dedicated button

LiveBox Features

- IVTech products are user-friendly and compatible with classical lab protocols, enabling a quick and easy customer transition from standard cell culture supports;
- The modularity and connectivity of IVTech systems allow the implementation of multi-organ in-vitro models to study the cross-talk between different tissues or organs;
- IVTech products are optically transparent and designed to fit with the majority of microscope stages, enabling real time monitoring and imaging during cell culture experiments (Figure 2);
- IVTech products are highly versatile and allow customers to study different tissues or organs;
- Cell constructs can be easily collected from the LiveBox units at the end of the experiment for post-culture analysis, including staining or any other sample processing;
- The wet volume of LiveBox chambers mimics that of a 24 multiwell plate, allowing the use of the same protocols established for traditional cell culture supports;
- IVTech systems are reusable, limiting the waste production and contributing to maintain a green environment.
- IVTech products can be customized on the basis of customer needs

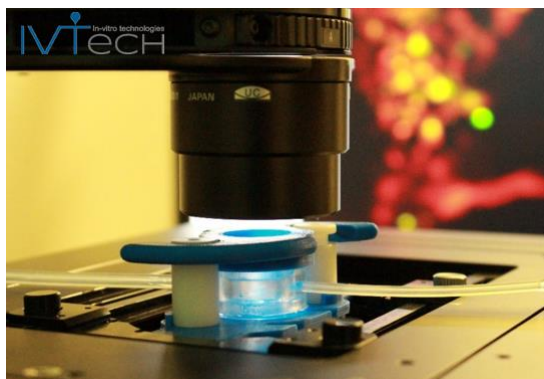


Figure 2. LiveBox1 monitored with an inverted microscope

Each LiveBox chamber is connectable with the fluidic circuit through luer-lock connectors.

A typical fluidic circuit is composed by different modules:

- 1 or more culture chamber
- 1 or more mixing chamber, a reservoir of culture medium (Figure 3). It can be equipped with a non-vented valve or a syringe filter for long term experiments.
- Tubes to join the different fluidic modules (Figure 3)

LiveFlow permits the circulation of the culture media from the mixing chamber to the LiveBox chambers. IVTech also offers accessories such as:

- Extractor, realized in plastic material, designed to permit an easy and fast removal of bioreactors from their clamp systems.
- Tubes shield, realized in plastic material, designed to house tubes and permit an easy handling of the fluidic circuits.

Figure 3 shows a typical fluidic circuit, where a LiveBox2 is connected to a LiveBox1. This circuit can be used to mimic the pathway of a drug which passes through the intestine barrier (LiveBox2) and then reaches a target tissue as the liver (LiveBox1).



Figure 3. An example of a fluidic circuit composed by 2 mixing chambers, 1 LiveBox1, 1 LiveBox2, tubes and pump

LiveBox configurations

Our innovative cell cultures chambers can be used in several configurations in order to meet different experimental specifications.

Figure 4 summarizes all the configurations that can be implemented using LiveBox chambers:

- LiveBox1 -> a 2D/3D tissue model can be implemented using a single flow configuration. Flow lines are tangential to the cell construct placed onto the basal surface of the chamber.
- LiveBox2 -> 2 different configurations:
 - Tangential flow configuration, suitable for physiological barriers simulation. The apical and basal chambers are perfused by 2 different and independent flows. The flow lines are parallel to the membrane surface.
 - Perfusion flow configuration, suitable for 3D cells construct perfusion. Flow lines cross the cells construct in the vertical direction. Two sub-configurations can be implemented, based on the flow direction: top-down or down-top configurations.

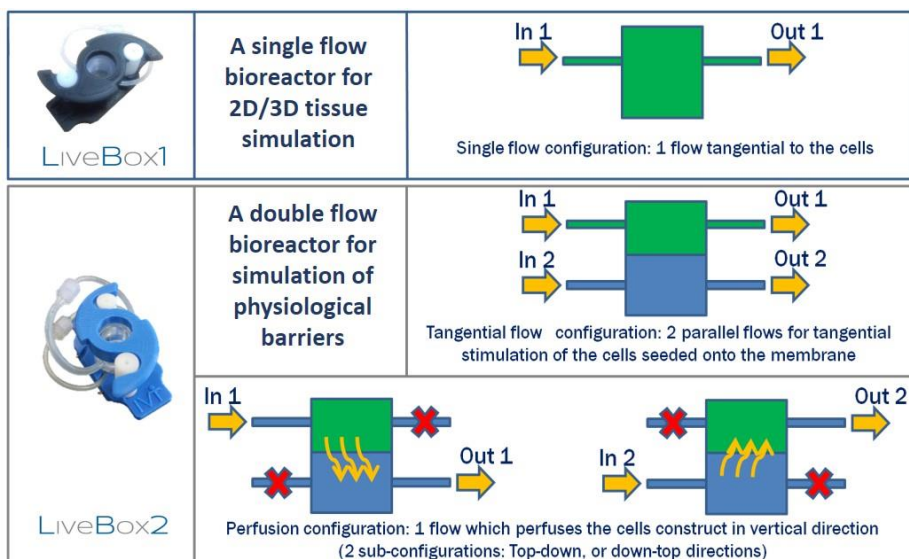


Figure 4. IVTech products and implementable configurations