InFlow

Modular perfusion bioreactor

InFlow CC100

InFlow is an incubator compatible, modular bioreactor for the controlled, bidirectional and interstitial perfusion of up to 9 cell seeded scaffolds with culture medium. InFlow is ideal for general purpose uses and is particularly suitable for the long-term culture of cylindrical fragments of BONE and CARTILAGE tissues.

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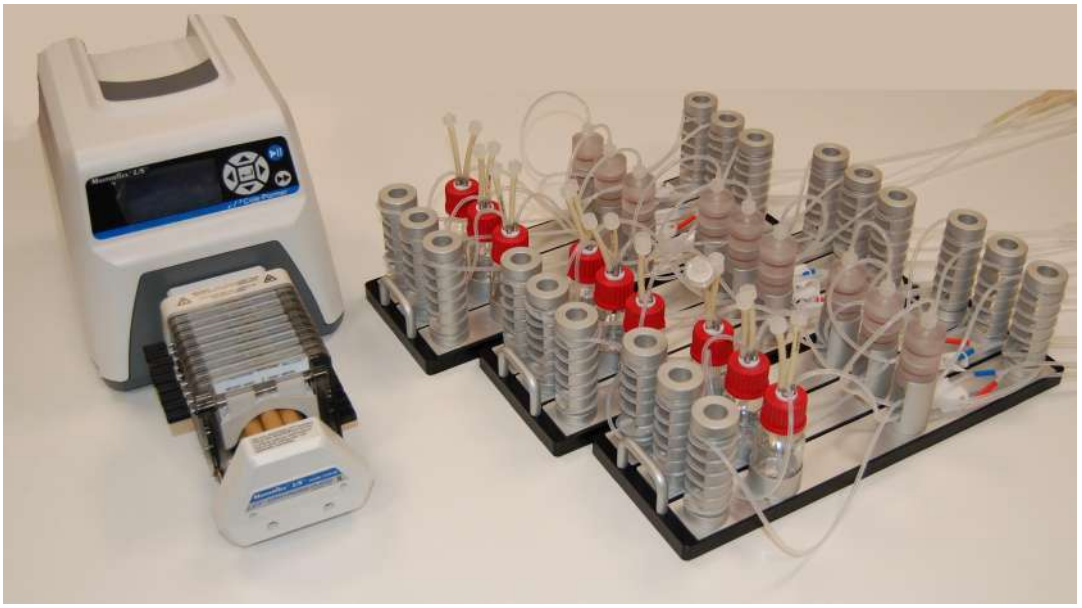
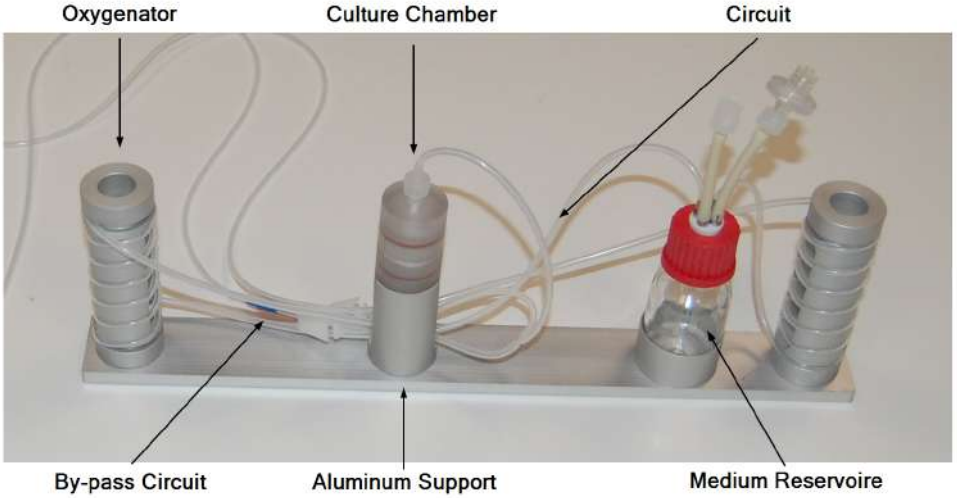


In Flow CC100 main features are:

- Three biologically and hydraulically independent perfusion lines
- Bi-directional perfusion
- Flow rate and direction set by user
- Timings of perfusion set by the user thru Timer-based controller
- Fast and safe priming function (manual or automated culture chamber by-pass)
- Different size scaffold holders
- Compatible with cylindrical porous scaffold
- Different flow range available
- Repeatability of conditions: no air couplings, pump acts directly on incompressible fluid
- “Time course” experiment, removing a single line each time

Single perfusion line

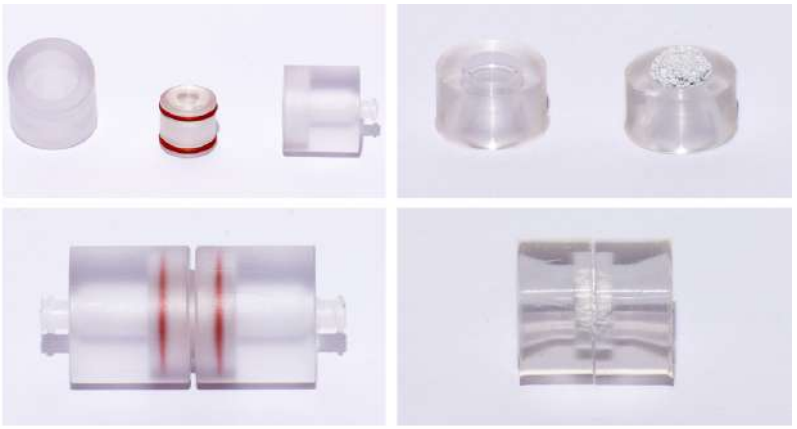
Each line presents a medium reservoir which ensures culture medium oxygenation through the presence of a sterile filter and medium sampling thanks to a Luer lock septum. Additionally, the circuit is made of silicone platinum cured tubing for culture medium oxygenation, pH balancing and minimum priming volume.



Culture chamber

Autoclavable culture chamber in polycarbonate (FDA-approved) with luer lock connection and o-ring.
Every chamber hosts a silicone adapter (scaffold holder) for cylindrical porous scaffold.
Standard scaffold sizes:
- 8 [mm] x h 2 [mm] Perfused diameter 6 [mm]
- 8 [mm] x h 4 [mm] Perfused diameter 6 [mm]
- 10 [mm] x h 2 [mm] Perfused diameter 8 [mm]
- 10 [mm] x h 4 [mm] Perfused diameter 8 [mm]
- 12 [mm] x h 2 [mm] Perfused diameter 10 [mm]
- 12 [mm] x h 4 [mm] Perfused diameter 10 [mm]

Other measures on request (change only the silicone adapters). Could be provided in disposable sterile bags.



Culture chamber *Scaffold holder*

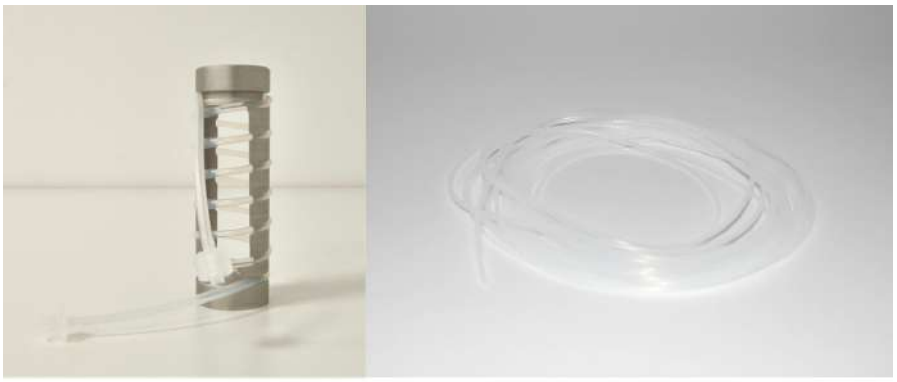
Medium reservoir

Autoclavable media bottle (25 ml) with special GL25 cap, with four accesses:
- Inlet/outlet port connected to the circuit (barbed fitting)
- Sampling/medium exchange port (luer lock fitting)
- 0,22 [µm] filter port (luer lock fitting)

Medium reservoir *Special GL25 cap*

Oxygenation

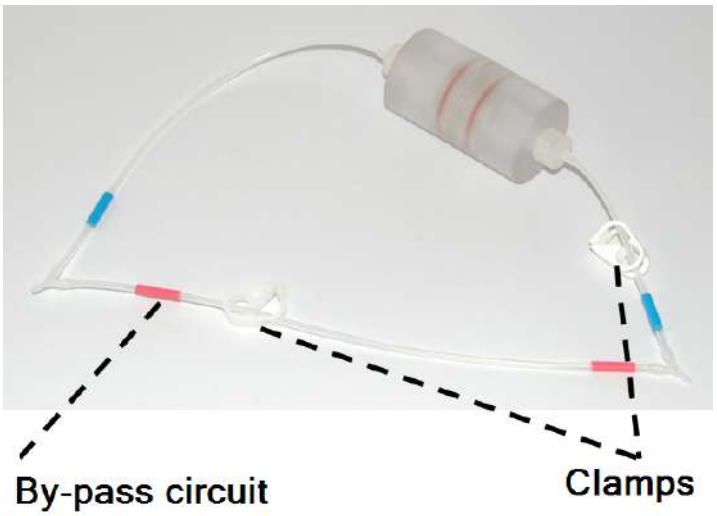
Two oxygenation coil structures per line, hosts up to 1.8 meters (0.9 meters each one) of platinum cured silicone tubing with high permeability to O_2 and CO_2 minimizing the occupied volume. Made of anodized aluminum, to allow the coiling of oxygenator tubing, avoiding handling difficulties and guaranteeing easy operations under GLP conditions.



Oxygenator *Platinum cured silicone tubing*

By-pass circuit

For a fast priming of the circuit (at maximum flow rate) excluding the culture chamber in order to avoid cell damages due to too high pressure or perfusion velocity. Connected to perfusion circuit by means of 2 Y shape barbed connectors.
By-pass circuit can be controlled through manual clamps systems (for basic and timer based versions)



Peristaltic pump

Peristaltic pump to set perfusion flow rate and direction (clockwise / anticlockwise). Available with different flow rate ranges and compatible with tubing size ID 1/32” and ID 1/16”. Supplied with up to 9-channel head and up to 9 cartridges. Compatible with two-stop PharMed® BPT tubes.

Standard flow rate range: 0.1 – 6 ml/min with 1/32” 2-stop tubing (1-100 rpm, 0.1 rpm step). Other options available.
Rotational speed (rpm) vs. Flow rate (ml/min) vs. Perfusion velocity according to scaffold perfused diameter (µm/s) are presented in the following table (a complete table is attached to user manual).

Sterilization

The whole system could be autoclaved or sterilized in EtO.

CONTROL SYSTEM

InFlow system could be purchased without controller and used with external third parties controllers or just in combination with a peristaltic pump.
The version without controller allows to set, directly on the peristaltic pump, flow rate and direction of perfusion. Otherwise InFlow can be equipped with a controller:

Timer based version

Option that allows to control only perfusion patterns (timing and direction). Manual flow rate and priming set directly on the pump.

Main features
- Set time and direction of a perfusion pattern (symmetric or asymmetric)
- Easy to use
- Compact system, cost and space saving
- Real-time control

Optical sensor option

The system can be integrated with flow-thru optical sensors to real-time on-line monitor culture parameters.
Available upgrades:
- pH optical sensors to monitor one perfusion line (the central reservoir) in each module.
- pH and/or O_2 flow through optical sensors connected in series with the hydraulic circuit.

Sensor in series with the circuit

TECHNICAL DATA

Material	Base: anodized aluminum Culture chamber: Polycarbonate and silicone Tubing: platinum-cured silicone Medium reservoir: glass
Number of parallel lines	3 or 6 or 9
Weight	Approx. 2 kg (3 lines)
Dimensions	375 x 130 x 85 mm (W x D x H) (3 lines)
Flow rate range	0.1 - 6 mL/min

ORDERING DETAILS

Product code	CC100

Standard options:

InFlow modular perfusion bioreactor is highly customizable and can be modified upon customer specification.
Further details will be clarified by our technical office during the technical definition stage.

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