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Россия +7(495)268-04-70
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CellASIC® ONIX M04G-02 Microfluidic Gradient Plate

For research use only. Not for use in diagnostic procedures.

Introduction

The CellASIC® ONIX M04G-02 Microfluidic Plate is a 4-chamber cell culture plate designed for use with the CellASIC® ONIX2 Microfluidic System and ONIX2 Manifolds for enabling perfusion-based, long-term, live-cell analysis with stable gradient formation and solution switching. This bio-inspired plate provides a controlled and dynamic microenvironment for culture of cells in standard planar (2D) and 3-dimensional formats. The easy-to-use format and superior technology redefine the standard for microfluidics-based experimentation.

Applications

- Time-lapse analysis of cells in a stable diffusion gradient (cell migration, chemotaxis, polarization)
- Gradient switching experiments (induction, inhibition, drug dosing)
- Comparison of up to four different cell types or exposure conditions (media components) in parallel
- Long-term continuous perfusion experiments (3 days typical)
- Temperature and gas atmospheric control (temperature shift, anoxic conditions)
- Automated immunostaining and "on-demand" fixation of live cells within the culture chamber

Plate Description

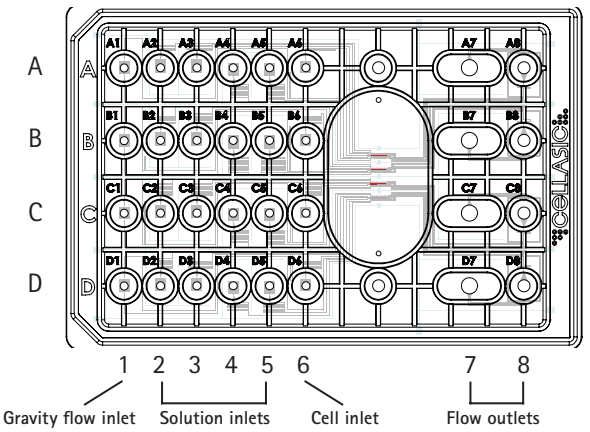

Figure 1. Plate configuration

The M04G microfluidic plate has four independent culture units (A-D), each with a gravity flow inlet (1), four solution inlets (2-5), a cell inlet (6), and two shared outlets (7 and 8). Flow channels are resistance matched for uniformity. Each row of wells (A-D) addresses the corresponding culture chamber. The plate is shipped preprimed with PBS (phosphate-buffered saline) solution, which can be replaced with a buffer of choice prior to experiment. The plate is for single use only.

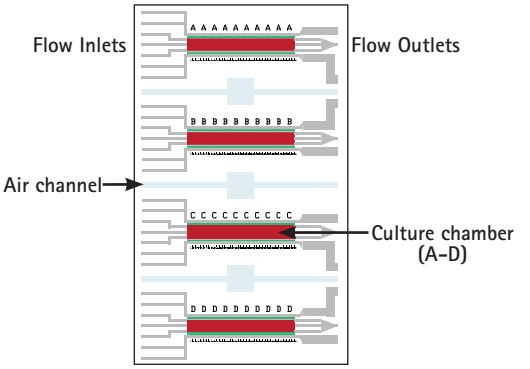

Figure 2. Chamber viewing window

All four culture chambers are located under a single viewing window to minimize travel distance for high-magnification phase objectives.

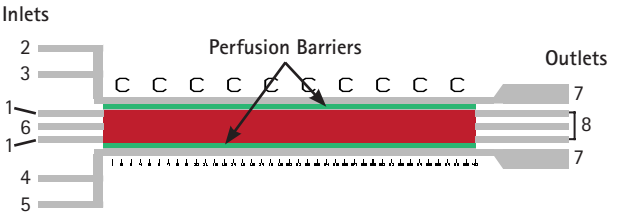

Figure 3. Culture chamber

Perfusion barriers bound the chamber on the top and bottom edges to separate the chamber from the flow channels. The inlet/outlet functions and minimum/maximum volumes for each culture unit are listed below.

	Function	Minimum Volume (µL)	Maximum Volume (µL)
Inlet 1	Inlet for gravity-driven perfusion	10	350
Inlet 2	Inlet for gradient establishment	50	350
Inlet 3	Inlet for gradient establishment	50	350
Inlet 4	Inlet for gradient establishment	50	350
Inlet 5	Inlet for gradient establishment	50	350
Inlet 6	Cell inlet for loading cells into culture chamber	10	350
Outlets 7 and 8	Accept flow-through from culture chamber	50	900*

* Outlets 7 and 8 combined

Manifold Description

The CellASIC® ONIX2 heated (CAX2-MXT20) or basic (CAX2-MBC20) manifolds connect the microfluidic plate to the CellASIC® ONIX2 Microfluidic System.

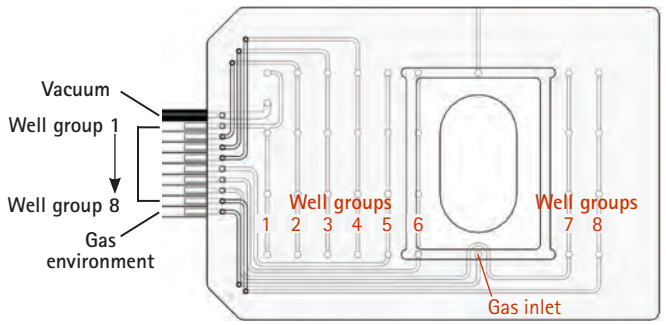

Figure 4. Lines to CellASIC® ONIX2 Microfluidic System

Flow control is achieved using air pressure above the liquid in each well. Multiple wells on a plate are grouped together and addressed by a single pneumatic line via the manifold. Each set of wells is called a "well group". A vacuum line is used to seal the plate to the manifold, and a gas line enables atmospheric control.

Flow Properties

Flow properties of wells 2–5 are shown in Figure 5 and those of well 6 are shown in Figure 6. Each figure shows the flow rate out of the well as a function of pressure. Solutions will diffuse through the perfusion barriers at the top and bottom of each cell chamber. If more than one channel is pressurized, multiply the well flow rate by the number of pressurized channels to derive the overall flow rate.

NOTE: The flow of liquid from well 6 is approximately 150 times faster than the flow from wells 2–5.

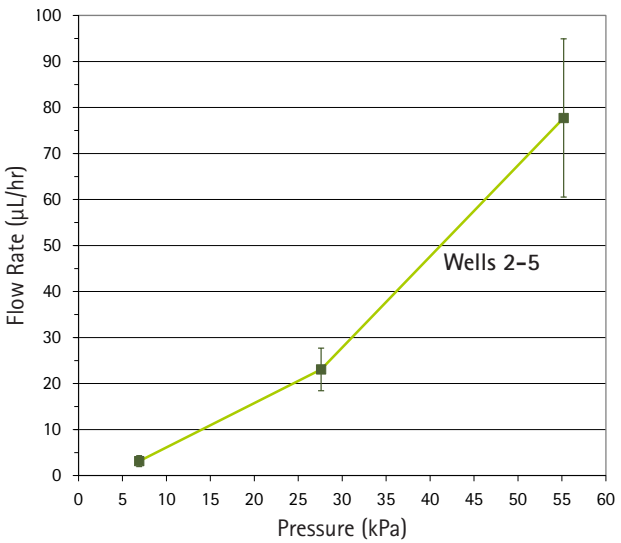

Figure 5. Flow rate for wells 2–5

Flow Properties, continued

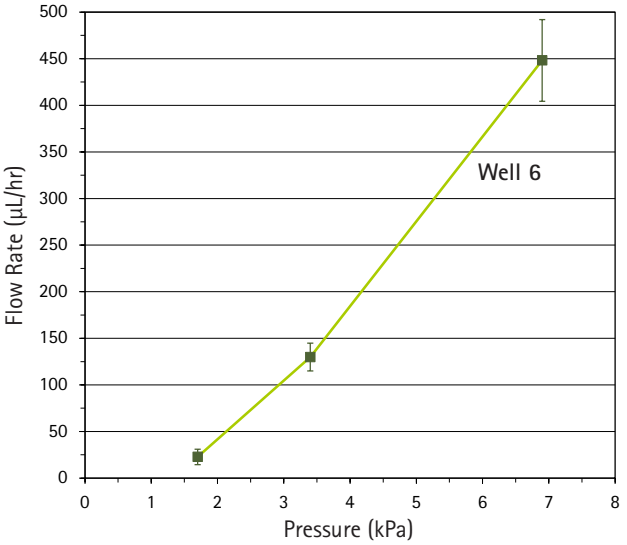

Figure 6. Flow rate for well 6

Plate Storage

Store at room temperature. Do not store in direct sunlight.

Limitations

The plate is incompatible with acetic acid and organic solvents such as acetone, ethanol, and methanol. Plates should be tested for compatibility with other acids or organic solvents prior to use.

Plate Operation

If fewer than four chambers are going to be used, aspirate only the inlet/outlet wells of the chamber row(s) being used. All unused chamber wells should be kept filled with PBS or other medium. During and after an experiment, keep the unused wells filled with medium to prevent drying out. Unused chambers may be used at a later time.

If temperature control is needed, use the CellASIC® ONIX2 Manifold XT (CAX2-MXT20). Refer to the CellASIC® ONIX2 Microfluidic System User Guide for setup instructions.

Precoating with ECM or Priming with Growth Medium

NOTE: ECM coating or priming with culture medium is recommended for either method of cell loading to ensure even distribution of cells in the culture chamber of the M04G plate.

Capillary Method

1. Prepare the ECM coating solution or medium according to desired procedure.
2. Aspirate PBS solution from the upper part of well 1 leaving PBS within the PTFE (polytetrafluoroethylene) ring at the bottom of the well.

   NOTE: The hydrophobic PTFE ring at the bottom of wells 1, 6, and 8 (Figure 7) provides sample containment, permitting loading of small volumes (≤ 10 µL) into these wells.

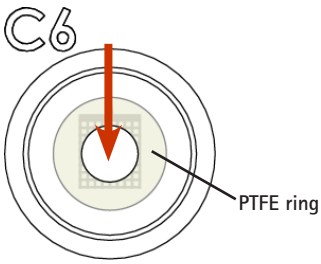

Figure 7. Well 6 cell inlet

Specifications

Culture Plate Dimensions	
Length × width	127.3 × 85.2 mm (5.0 × 3.4 in.)
Height without lid	14.3 mm (0.6 in.)
Culture Chamber Dimensions	
Length	4.0 mm (0.16 in.)
Width	0.5 mm (0.02 in.)
Height	50 µm
Culture chamber sample volume	0.1 µL
Glass bottom thickness (#1.5 slide)	170 µm
Plate materials of construction	Polycarbonate, silicone, acrylic, glass

Product Ordering Information

This section lists catalogue numbers for the CellASIC® ONIX products. See Technical Assistance section for contact information. You can purchase these products and find the most up-to-date software, plate maps, and user guides at www.millipore.com/cellasic.

Description	Catalogue Number	Qty/pk
Microfluidic Plates		
CellASIC® ONIX Plate for Bacteria Cells (4-chamber, trap heights of 0.7, 0.9, 1.1, 1.3, 2.3, and 4.5 µm)	B04A-03-5PK	5
CellASIC® ONIX Gradient Plate for Mammalian Cells (4-chamber)	M04G-02-5PK	5
CellASIC® ONIX Open-top Plate for Mammalian Cells (4-chamber)	M04L-03-5PK	5
CellASIC® ONIX Switching Plate for Mammalian Cells (4-chamber)	M04S-03-5PK	5
CellASIC® ONIX Plate for Haploid Yeast Cells (4-chamber, trap heights of 3.5, 4.0, and 4.5 µm)	Y04C-02-5PK	5
CellASIC® ONIX Plate for Diploid Yeast Cells (4-chamber, trap heights of 5.0, 6.0, and 7.0 µm)	Y04D-02-5PK	5
CellASIC® ONIX Pad Trap Plate (4-chamber, trap height of 4.0 µm)	Y04T-04-5PK	5
CellASIC® ONIX2 Microfluidic System and Manifolds		
CellASIC® ONIX2 Microfluidic System	CAX2-S0000	1
CellASIC® ONIX2 Manifold XT (temperature controlled)	CAX2-MXT20	1
CellASIC® ONIX2 Manifold Basic (no temperature control)	CAX2-MBC20	1
Replacement Parts/Accessories		
CellASIC® ONIX2 Filter Multiconnector (includes filters)	CAX2-AMC00	1
CellASIC® ONIX2 Software USB Drive	CAX2-SSW01	1
CellASIC® ONIX2 Gasket	CAX2-AGK20	1
CellASIC® ONIX2 Self Check Plate	CAX2-ASP20	1
CellASIC® ONIX2 Cleaning Plate	CAX2-ACP20	1
CellASIC® ONIX2 Replacement Filter Pack (9 × 4 mm and 1 × 13 mm Millex® 0.45 µm PTFE filters)	CAX2-AFP00	1
CellASIC® ONIX2 Accessory Fittings (quick-connect gas fitting, 2/pk)	CAX2-ABF00	1

Product Ordering Information, continued

Description	Catalogue Number	Qty/pk
Replacement Parts/Accessories		
CellASIC® ONIX2 Temperature Calibration Plate	CAX2-ACT20	1
CellASIC® ONIX2 Premixed Gas Regulator (for use with 103 L or 112 L gas cylinders with a C10 connection)	CAX2-ABR00	1
CellASIC® ONIX2 Microfluidic Services		
CellASIC® ONIX2 Essential Service Plan	CAX2-ESVC	1
CellASIC® ONIX2 Total Service Plan	CAX2-TSVC	1
CellASIC® ONIX2 Installation	CAX2-INST	1

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