microfluidic ChipShop

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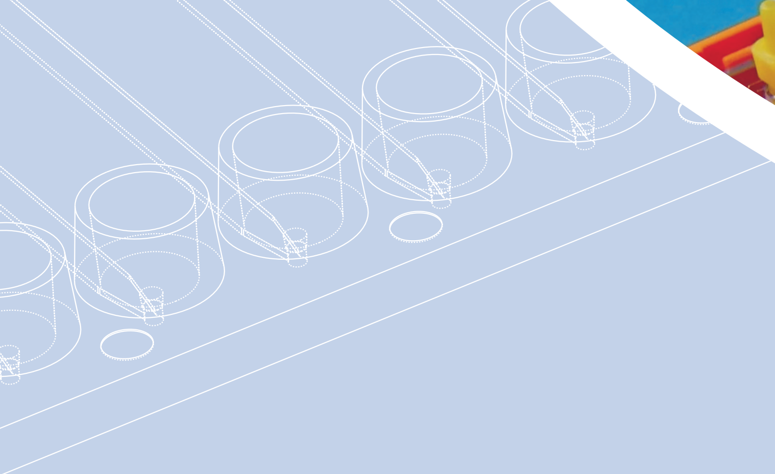
Lab-on-a-Chip Catalogue

Lab-on-a-Chip Catalogue 10/2023



microfluidic ChipShop – The company

The lab on the chip – miniaturized solutions as easier and faster analytical tools for the life sciences, diagnostics, analytical sciences, and chemistry are at the heart of *microfluidic ChipShop*'s business.

The company, started in 2002 as a spin-off from the Fraunhofer Institute for Applied Optics and Precision Engineering and the Application Center for Microtechnology Jena, has become a world leader in this rapidly growing technology field. Specialists from microfluidics, precision engineering, polymer microtechnology, medical technology, chemistry, biology, and diagnostics form a multi-disciplinary team to develop and manufacture "lab-on-a-chip" systems mainly in polymers. Using industrial manufacturing techniques allows a seamless transition from development stage through small batch production to mass fabrication, an important role in comprehensive support for our customers.

Precision manufacturing on the micrometer scale

A unique feature in *microfluidic ChipShop*'s services is to offer miniaturized components and systems both as self-developed standard products as well as customized solutions from prototype to volume production. *microfluidic ChipShop* covers the entire value and technology chain, starting from the design of the microstructures, followed by mold-insert fabrication, polymer replication using precision injection molding, hot embossing, or casting, mechanical processing steps up to the biochemical functionalization of surfaces and reagent storage on the chip, and finally, industrial quality control. In addition, *microfluidic ChipShop* supports customers in the miniaturization of their biological and diagnostic tasks, e.g. in the transfer of biological assays on the chip, the development of PCR protocols for chip-based applications, or the selection of suitable materials for the immobilization of biomolecules. For these means, the company has its own application department.

Furthermore, the development of complete systems including instrument, chip, and associated application protocols is carried out by *microfluidic ChipShop*; examples include systems for the polymerase chain reaction in a continuous flow or chip-based capillary electrophoresis. To implement these highly complex projects, *microfluidic ChipShop* maintains a worldwide network of research and development collaborations.

In order to fulfill our customers' needs and to deal with all regulatory issues associated with the development and fabrication of diagnostic and medical devices, *microfluidic ChipShop* has been certified according to DIN EN ISO 9001 and DIN ISO 13485 since 2003.

Miniaturized solutions for diagnostics, analytical sciences, and life sciences

Miniaturization has already transformed the world of electronics and became a driver for many markets. Now it's a driving force for an innovation in the life sciences, diagnostics, analytical sciences, and chemistry, which is labeled "lab-on-a-chip." The use of micro- and nano-technologies allows the development of fast, portable, and easy-to-use systems with a high level of functional integration for applications such as point-of-care diagnostics, forensics, the analysis of biomolecules, environmental or food analysis, and drug development. The core of such "lab-on-a-chip" systems are polymer substrates in standard laboratory formats such as microscopy slides or microtiter plates, equipped with tiny structures for the transport and handling of samples. All the functionalities of a chemical or biochemical laboratory, such as the mixing of liquids, aliquoting, the amplification of biomolecules, the synthesis of novel materials, the hybridization of DNA molecules, or the detection of specific substances by optical or electrochemical methods, can be integrated on a single chip. Furthermore, components such as filtration or separation membranes, valves, biochemical sensors, electrodes, and magnetic beads can be implemented into a microstructured polymer substrate.

The integration of biochemical functions on a single chip makes numerous time-consuming and potentially error-prone individual steps redundant, such as multiple pipetting or sample transfer from one device to another.

Standardization: Established formats – Innovation in the core

Lab-on-a-chip technology as a novel technology offers a wide range of advantages for the different applications and at the same time throws up some challenges. On the one hand, restrictions on using novel tools need to be overcome, while on the other hand the introduction of new technologies needs to be affordable. In order to meet these challenges, *microfluidic ChipShop* drives standardization efforts forcefully:

In chip formats, *microfluidic ChipShop* makes use of existing laboratory standards like the microscopy slide or the microtiter plate, allowing the use of standard laboratory equipment like microscopes, pipettes, or laboratory automation. Directly integrated fluidic interfaces enable an easy chip-to-world coupling and a seamless transfer of liquids from the standard lab to the microworld.

The second major advantage of the strict implementation of the standardization concept is cost. During the development process, an investment in an injection-molding tool is a significant hurdle, especially for small- and medium-scale production. To overcome this obstacle, *microfluidic ChipShop* has various injection-molding tools that can be used on existing platforms – ranging from microscopy slides, microtiter plates, to the CD format – for the integration of custom-specific designs. This approach not only minimizes costs, but it also speeds up the development process, since the time from design release to the first chips in our customers' hands can be reduced significantly.

microfluidic ChipShop – Our infrastructure

In May 2011, *microfluidic ChipShop* moved into its new corporate headquarter, which was extended with a second buiding in 2015. Our third building is in the planning phase and we are already looking forward to celebrate our groundbreaking ceremony this year. As of Jan 2022, on a space of approx. 4.700 sqm (approx. 52.000 sqft) the purpose-built facility, located in one of Jena's new industry parks conveniently close to the autobahn, contains all the required infrastructures for your one-stop-shopping in microfluidic development and production. The buildings are organized in four main areas: The first wing contains the precision mechanic workshops. In this area, the design and generation of molding tools, mold inserts and precision machined polymer or metal components takes place. Design data generated by our CAD/CAM team is transformed into parts and tools by our precision and ultraprecision milling and turning machines. These machines as well as equipment for electro-discharge machining (EDM) are placed in a climate-controlled environment with a temperature control of ± 0.5°C, partly with especially vibration-isolated foundations.

For the manufacturing of polymer parts using injection molding and hot embossing, a temperature controlled clean space of approx. 400 sqm (4.300 sqft) is provided. The injection molding machines are housed in clean-room hoods in order to reduce the particle load. From this area, the parts are transported into a class 7 cleanroom area of 500 sqm (5.400 sqft) for back-end processing. In this area, processes like surface functionalization, integration of wet and dry reagents, spotting, assembly and packaging takes place. Optical measurement stations including a confocal white-light interferometer and high-precision stereo microscopes are complemented by functional fluidics testing stations for an industrial quality control of our manufactured goods.

The third division contains our biological and biochemical laboratories. In these labs, our team of biologists and chemists develops protocols for on-chip assays, reagent storage solutions or surface modifications for our customers. For this purpose, equipment like spotting tools, PCR machines, lyophilizers or electrophoresis stations is available. These labs also house our microfluidics instrumentation labs, where not only our own instruments, the ChipGenie series, are developed, but also validation experiments for the microfluidic characterization of components and systems are carried out.

The fourth area houses the system development and manufacturing group. In well-equipped laboratories, our mechanical and electrical engineers develop customer-specific instrumentation for all areas of microfluidics-enabled products which, again, can be validated using our application laboratories. This has been a very rapidly growing business field for the company and allows *microfluidic ChipShop* to offer all aspects of a microfluidic system development from the very first design concepts to an overall manufacturing of instruments and consumables.

Training facilities for up to 200 people and office space for guest scientists and development partners complement our infrastructure offerings.

The *Lab-on-a-Chip Catalogue* – Shortcut to the world of microfluidics

Offering catalogue devices and development platforms, fulfilling common laboratory standards in their dimensions and interfaces, *microfluidic ChipShop* allows users a quick, low-cost, and low-risk entry into the innovative field of microfluidics. The chips offered within *microfluidic ChipShop's Lab-on-a-Chip Catalogue* cover a range of applications from simple liquid handling, electrophoresis, extraction, or mixing up to sample preparation and complete analytical tasks.

Please enjoy our *Lab-on-a-Chip Catalogue* as your roadmap to microfluidics. We will be more than happy to assist you with our design and fabrication services as well as to discuss your special requirements in the microfluidic world.

Yours,

Dr. Claudia Gärtner
CEO

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1 *microfluidic ChipShop's* Lab-on-a-Chip Catalogue

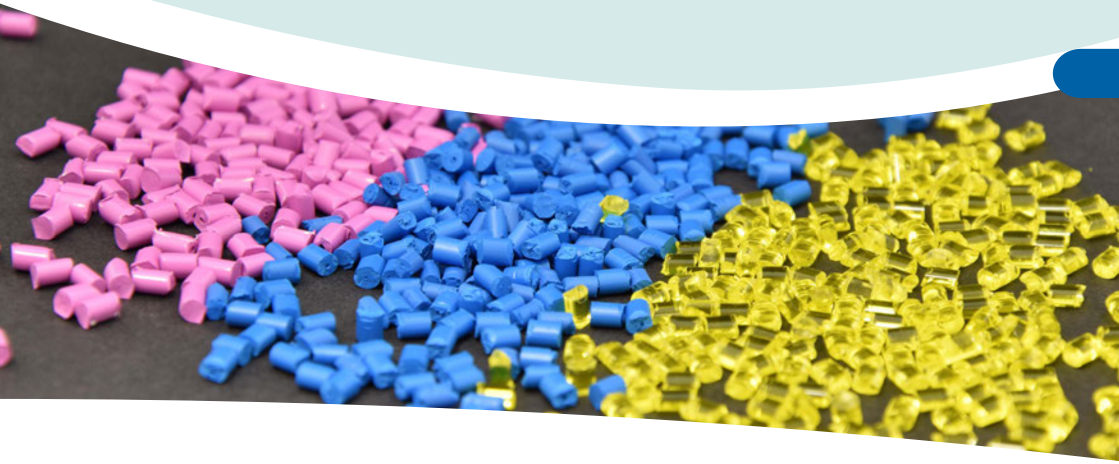
Our mission at *microfluidic ChipShop* is to shrink the biological and chemical laboratory and to bring lab-on-a-chip systems into daily laboratory life.

This catalogue is part of our service to make our mission happen: From off-the-shelf microfluidic chips to complete lab-on-a-chip systems, our products serve a wide range of customer needs.

Whether you need a single chip or thousands, in the following pages you will find the essential components for an easy route into the world of microfluidic handling and manipulation. Be it for the first steps with lab-on-a-chip systems or the evaluation of new designs and functions: you do not need to make up your own design, you avoid tooling costs, and we ensure fast delivery to your doorstep.

Of course, our expertise at *microfluidic ChipShop* extends well beyond the products listed in this catalogue: Whether you seek a competent microfluidic-chip manufacturer, whether you want to translate specific functions into microfluidic designs, whether you need to adopt biological or biochemical assays to a miniaturized format or develop them from scratch for a microfluidic consumable or whether you want to develop entire lab-on-a-chip systems, we are here to help you with our full range of production and development services.

2 Materials in microfluidics



Materials in microfluidics

Material matters – and a large choice of different materials is at hand ranging from a wide variety of polymers, to glass, silicon, ceramics or metals. All materials have their pros and cons, looking e.g. at cost or geometrical freedom polymers are dominating. This chapter gives guidance through the material choice. Off-the shelf devices are at hand in polymers and in glass, custom-designs can be offered in all kind of materials and material combinations.

2.1 Materials in microfluidics

In microfluidics, a wide variety of materials is in use. Historically, microfluidics and the use as lab-on-a-chip for applications in life sciences or analytical sciences started with technologies being available from semiconductor industries. Consequently, since these technologies were available and allowed for microstructuring, they were used for the first microfluidic devices. Materials that were applicable to be structured by technologies used in semiconductor industries were glass and silicon. First microfluidic devices, besides ink jet printer heads for non-life science microfluidics, were made from glass and silicon, reaching back to the 1970ies with Stephen Terry's gas chromatograph integrated on a silicon wafer, functional but rather expensive.

These semiconductor manufacturing technologies have been available at many engineering institutes, thus these disciplines pioneered in microfluidics due to the availability of elaborate and usually expensive technologies.

Another manufacturing technology arose by simply taking the microstructured silicon devices made by the semiconductor technologies and replicating the structures into a soft polymer in a process called casting (often also referred to as "soft lithography"), just by pouring the liquid polymer onto the silicone matrix, hardening it and removing the soft polymer replicate. This process can be repeated many times, and besides one-time investment in the silicon master, it is from an equipment point of view an extremely low-cost technology. Material used for this process is a special kind of silicone, usually PDMS (Polydimethylsiloxane).

Later on, a merger of conventional fabrication technologies for e.g. standard life science plastic lab ware, namely injection molding, with microtechnology took place. The challenge that had to be overcome to make this technology available for microfluidics was in a first instance the generation of the microstructured master in metals that withstands, depending on the feature sizes, several thousands to several hundred thousand replication cycles. After the replication, assembling technologies needed to be developed. The adoption of industrial replication technologies in combination with the wide variety of commercially available polymers enables a most cost efficient fabrication together with the widest design freedom and is the reason for the current progress made in the commercialization of microfluidic devices.

2.2 Materials and underlying technologies

Each material has different characteristics and the technology choice for the micro-structuring has to be made accordingly. An overview on the different technologies being applied is given in Table 1.

Table 1: Technologies for microstructuring of different materials

Material	Technology	Comment
Metal	• Precision mechanical machining • Laser machining • Electro discharge machining	
Silicon	• Wet chemical etching • Dry etching (DRIE)	
Glass	• Wet chemical etching • Direct laser structuring • Powder or sandblasting • Photostructuring	
Elastomers	• Casting	
Thermoplastic polymers	• Injection molding • Thermoforming • Hot embossing • Laser machining • Precision mechanical machining	Injection molding as replicative technology allows for the most cost-efficient fabrication of microstructured devices. Thermoforming is mainly used for generating blister packs.

The fabrication of a lab-on-a-chip system requires more than just the microstructured part. Usually at least a cover lid needs to be placed on the microstructures, requiring special assembly technologies.

For glass and silicon, established processes are at hand, easily exceeding 100°C temperature, even for "cold" processes. The elastomer silicone can be easily mounted onto itself or glass and silicon, but the joint can be released. For thermoplastic polymers, several technologies are at hand allowing to join parts without harming microstructures and working without elevated temperatures, preserving embedded reagents or deposited biomolecules.

2.3 Glass versus polymers

The comparison of two main materials in microfluidics, namely glass and polymers, shows their specific strengths and weaknesses.

Glass and the standard thermoplastic polymers being in use in microfluidics are highly optically transparent.

Table 2 summarizes pros and cons of glass versus polymers.

Table 2: Characteristics of glass and polymers

Optics	Standard thermoplasts	Glass
Transparency	• Good	• Good
Autofluorescence	• Low (right polymer choice important)	• Low
Application in UV region	• In near UV special polymers available	• Quartz glass needs to be chosen
Surface roughness	• Depending on mold insert quality. • Can be optically smooth. • Rough surface after direct mechanical machining	• Smooth for wet etched devices, rough surface after powderblasting or laser machining. Afterward chemical poli shing possible.
Thermal stability	• Depending on the polymer choice. Standard polymers used for PCR application withstand 100°C and slightly higher temperatures.	• Usually transfers to liquid phase around 600°C for many glasses
Stability against organic solvents	• Limited	• High
Stability against standard solvents in life sciences (acetone, alcohol)	• Polymers available	• High
Stability against acidic solutions	• High	• High
Stability against basic solutions	• High	• Medium
Unspecific binding of biological components	• Polymers with low unspecific binding available. Surface functionalization to avoid this problem available	• High. Surface functionalization to avoid this problem available
Part design		
Design freedom	• High	• Low
Combination of different structural depths in one device	• Easy	• Difficult and more than one depth directly increases the price
Direct integration of fluidic interfaces	• Easy – directly in the injection molded part	• Difficult, usually an afterwards assemb-ling process of a non-glass-component
Direct integration of e.g. reservoirs	• Easy – directly in the injection molded part	• Limited. Large structures cannot be inte-grated as glass part due to cost issues.

Additional functionalities	Standard thermoplasts	Glass
Integration of liquid and dry reagents in the chip	• Easy	• Limited to impossible. For bioreagents like enzymes with limited thermal stability impossible.
Integration of hybrid components like filters	• Easy	• Limited to impossible
Integration of valves on chip	• Easy	• Limited to passive and elastomeric membrane valves
Fabrication		
Material cost	• Low to medium, 2 – 20 € / kg	• High
Highest price impact	• Replication (microstructuring) has a negligible impact! • Assembly	• Footprint of the device. E.g. already the material price for a microfluidic chip in the format of a microscopy slide is a few € (depending on material choice). • Microstructuring • Assembly

Possessing different characteristics and financial benefits, polymers will always be used when glass is not required, since they are the cheaper devices. Glass is of interest if elevated temperatures are necessary, much above 100°C, what is usually not the case in life sciences, and if specific organic solvents should be used.

If bioreagents should be stored on-chip, complex fluidics, hybrid components like membranes are necessary, valves should be part of the device etc. polymers will be the material of choice.

Furthermore, interfaces, reservoirs and different structural depths do not impact the price of the device in polymers, but partly are impossible to be implemented in a glass device or massively increase cost.

2.4 Polymers in microfluidics

Polymers used in microfluidic are mainly transparent thermoplastic polymers. Most popular are PMMA (Polymethylmetacrylate), COC (Cyclo-olefin-copolymer, tradename “Topas”), COP (Cyclo-olefin-polymer, tradenames “Zeonor” and “Zeonex”), PC (Polycarbonate) and PS (Polystyrene). Topas and Zeonor have outstanding optical characteristics, very low water uptake and extremely low permeability for water vapour. Furthermore, they withstand polar organic solvents like acetone and isopropanol frequently used in life sciences.

Table 3: Standard polymers used at *microfluidic ChipShop* – PMMA

Material	Grades	Description
PMMA – Polymethylmeta-crylate	mcs-PMMA-08 • Tg: 110°C • Refractive index: 1.49 mcs-foil-147 • 175 μm thickness • Tg: 112°C • Refractive index: 1.48	**PMMA** is a transparent thermoplastic, often used as a lightweight or shatter-resistant alternative to glass. It is sometimes called acrylic glass or Plexiglass. Chemically, it is the synthetic polymer of methyl methacrylate. PMMA is an acrylate polymer with an ester-group. This can be used to modify the surface chemically.
Chemical Resistance:		
Can be used with:		Not to be used with:
• Aqueous solutions including diluted acids and bases • Aldehydes • Amines • Oils and Fats		• Concentrated acids and bases • Alcohols • Esters • Ketones • Aromatics • halogenated hydrocarbons

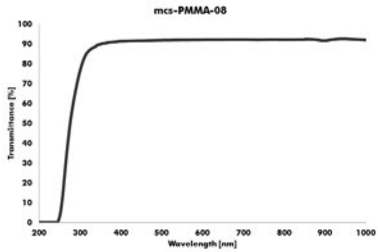


Fig. 1: Transmission spectrum of 1.5 mm thick microscopy slide of mcs-PMMA-08

Table 4: Standard polymers used at *microfluidic ChipShop* – PC

Material	Grades	Description
PC – Polycarbonate	mcs-PC-13 • Tg: 145°C • Refractive index: 1.58 mcs-foil-042 • 175 μm thickness • Tg: 145°C • Refractive index: 1.58	**PC** is thermoplastic polymer. Compared to other materials used in microfluidics like Zeonor or Topas it is less hydrophobic and therefore, the channels show a better filling behaviour. It can be used for higher temperature applications like e.g. PCR. The drawback of this material is the relatively high intrinsic fluorescence in particular of the available foil material, compared e.g. to Topas, Zeonor or PMMA.

Chemical Resistance:

Can be used with:	Not to be used with:
• Diluted acids • Oils, fats • Alcohols	• Bases • Esters • Ketones, Aldehydes • Amines • Aromatics

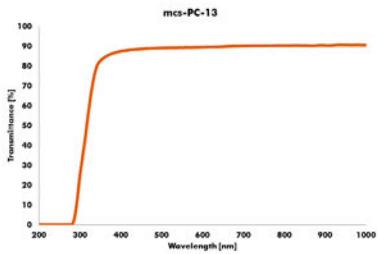


Fig. 2: Transmission spectrum of 1.0 mm thick microscopy slide of mcs-PC-13

Table 5: Standard polymers used at *microfluidic ChipShop* – PS

Material	Grades	Description
mcs-PS-17	mcs-PS-17 • Tg: 100°C • Refractive index: 1.57 mcs-foil-075 • 125 µm thickness • Tg: 100°C	**PS** is a thermoplastic polymer. Polystyrene (PS) is an aromatic polymer made from the monomer styrene. Polystyrene can be rigid or foamed. General purpose polystyrene is clear, hard and brittle. It is a very inexpensive resin per unit weight. It is a rather poor barrier to oxygen and water vapor and has relatively low melting point. PS is one of the standard material conventionally used in the life sciences also due to is relatively low price. E.g. microtiter plates are usually made from PS.

Chemical Resistance:

Can be used with:	Not to be used with:
• Bases • Butyl alcohol, ethylene glycol • Organic acids like citric acids, formic acids, tartaric acids • Diluted inorganic acids at lower temperatures (except hydrofluoric acids) • Mineral oil • Hydrogen oxide	• Ketones • Esters • Ethers • Halogenated organic reagents • Hydrocarbons (mineral oil works)

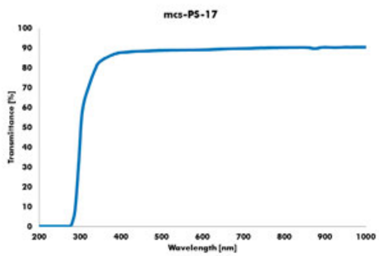


Fig. 3: Transmission spectrum of 1.0 mm thick microscopy slide of mcs-PS-17

Table 6: Standard polymers used at *microfluidic ChipShop* – Topas (COC)

Material	Grades	Description
Topas (COC)	mcs-COC-13 • Tg: 142°C • Refractive index: 1.53 mcs-foil-011 • 140 µm thickness • Tg: 78°C • Refractive index: 1.53 mcs-foil-081 • 175 µm thickness • Tg: 142°C • Refractive index: 1.53	**Topas** is thermoplastic polymer. It is cyclo-olefin copolymer (COC). It is completely nonpolar and amorphous. It has a very low permeability for water vapour and a low capacity for the absorption of water. Please be aware that mcs-foil-011 is not suitable for high temperature applications as it features a Tg of around 75°C, instead mcs-foil-081 should be chosen for those kinds of applications.

Chemical Resistance:

Can be used with:	Not to be used with:
• Aqueous solutions including acids and bases • Polar solvents • Can be used with mcs-oil-04 • Silicone oil	• Nonpolar solvents • Mineral oils (hydrocarbons) • Fats • Halogenated hydrocarbons

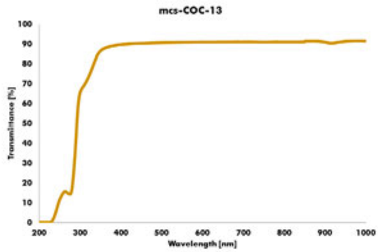


Fig. 4: Transmission spectrum of 1.0 mm thick microscopy slide of mcs-COC-13

Table 7: Standard polymers used at *microfluidic ChipShop* – Zeonor (COP)

Material	Grades	Description
Zeonor (COP)	mcs-COP-02 • Tg: 136°C • Refractive index: 1.53 mcs-foil-005 • 188 μm thickness • Tg: 134°C • Refractive index: 1.53	**Zeonor** is a thermoplastic polymer. Zeonor is a cyclo-olefin polymer (COP). It is completely nonpolar and amorphous. It has a very low permeability for water vapour and a low capacity for the absorption of water.

Chemical Resistance:

Can be used with:	Not to be used with:
• Aqueous solutions including acids and bases • Polar solvents • Can be used with mcs-oil-04 • Silicone oil	• Nonpolar solvents • Mineral oils (hydrocarbons) • Fats • Halogenated hydrocarbons

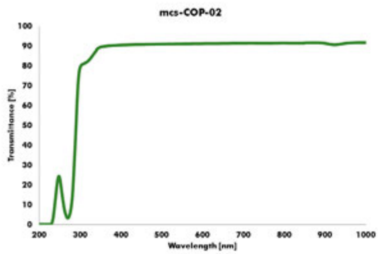


Fig. 5: Transmission spectrum of 1.0 mm thick microscopy slide of mcs-COP-02

Table 8: Standard polymers used at *microfluidic ChipShop* – Zeonex (COP)

Material	Grades	Description
Zeonex (COP)	mcs-COP-04 • Tg: 134°C • Refractive index: 1.53 mcs-foil-005 • 188 µm thickness • Tg: 134°C • Refractive index: 1.53	**Zeonex** is thermoplastic polymer. Zeonex is a cyclo-olefin polymer (COP). It is completely nonpolar and amorphous. It has a very low permeability for water vapour and a low capacity for the absorption of water.

Chemical Resistance:	
Can be used with:	Not to be used with:
• Aqueous solutions including acids and bases • Polar solvents • Can be used with mcs-oil-04 • Silicone oil	• Nonpolar solvents • Mineral oils (hydrocarbons) • Fats • Halogenated hydrocarbons

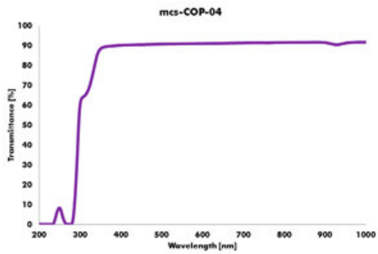


Fig. 6: Transmission spectrum of 1.0 mm thick microscopy slide of mcs-COP-04

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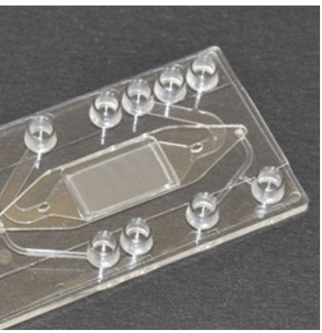
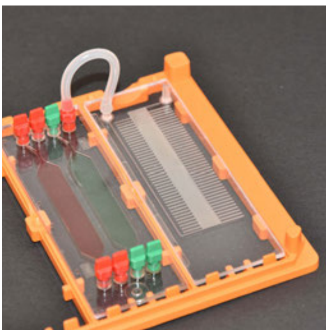
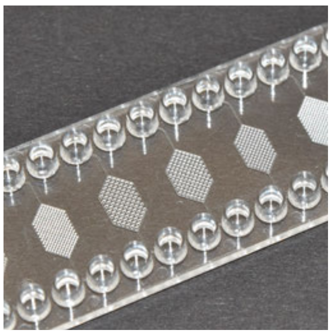
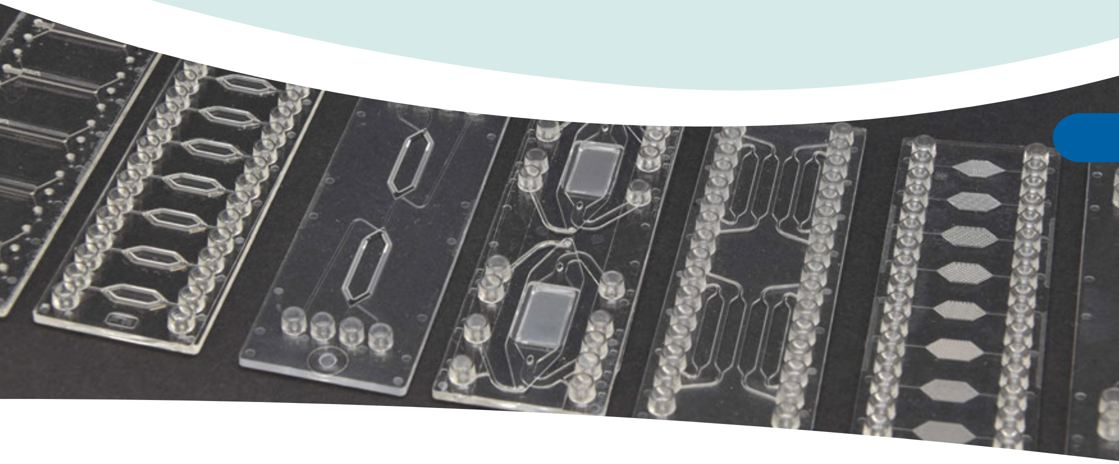






3 Microfluidic chips – Polymers



Microfluidic chips – Polymers

Ready-to-go microfluidic chips – this chapter summarizes various kinds of standard chips such as simple straight channels, cross-shaped channel chips for electrophoresis, extractors, micro-mixers, droplet generators, and nanotiter plates.

Taking our standardization principles into account, all these chips have the format of a microscopy slide or a microtiter plate. The spacing between the fluidic interfaces either corresponds with the spacing of a 96 or 384 well plate, namely 4.5 mm or 9 mm respective distance from center to center of the wells. All polymer chips have the fluidic interconnections on the top and the microfluidic structure on the bottom side. The micro structures are sealed with a cover lid of identical material. The thickness of the respective cover lid is indicated in the product.

3.1 Introduction to microfluidic chips

Microfluidic chips can vary greatly in their design and complexity. However, a few design features most chips have in common: the injection molded chip body with a microfluidic channel/chamber network, a cover lid and fluidic interfaces. The following two pages will guide you through the world of basic chip design and will help you to choose a chip layout tailored to your experimental requirements.

Microfluidic chip components

The most important components of a microfluidic chip are illustrated below. Beside basic functionalities chips can for example furthermore feature blisters for liquid storage, valves for steering liquids within the chip or integrated sampling areas.

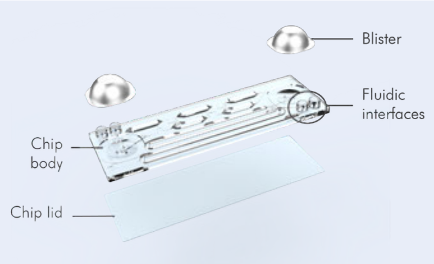


Fig. 7: Components of a microfluidic chip

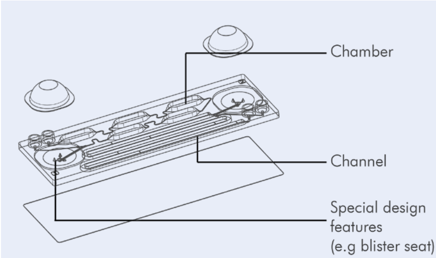


Fig. 8: Common design features on a microfluidic chip

Chip interfaces

In order to connect the microfluidic chip to tubing or to introduce liquid e.g. via pipetting each chip contains fluidic interfaces. The four standard interfaces, featured on *microfluidic ChipShop* chips are outlined in the following.

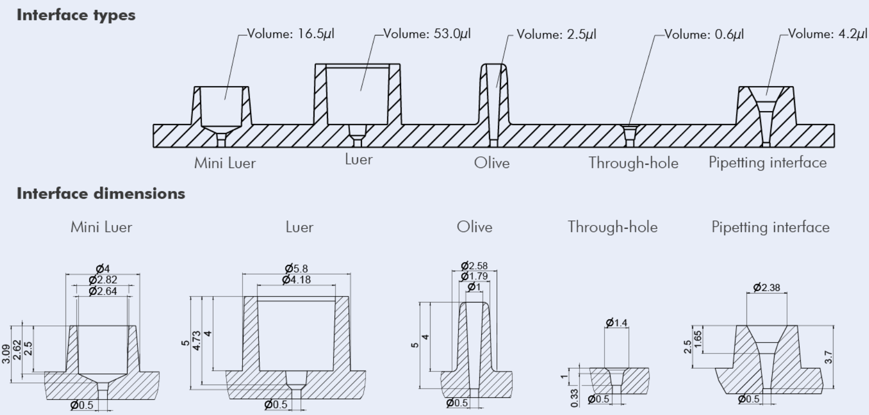


Fig. 9: Detailed schematic drawing of the four standard fluidic interfaces featured on *microfluidic ChipShop* chips

Chip formats

Most of our off-the-shelf microfluidic chips come in microscope slide format (75.5 mm x 25.5 mm x 1.5 mm). However, other standard chip formats such as double slide format (75.5 mm x 50mm x 1.5 mm) and microtiter plate format (85.48 mm x 127.76 mm) are available. When developing a customer-specific chip design, tailered custom-formats can be introduced. Please refer to Chapter 16 to learn more about or fabrication services.
For the standard microscope slide format, the microfluidic interfaces can be either positioned at the short or long side of the chip.

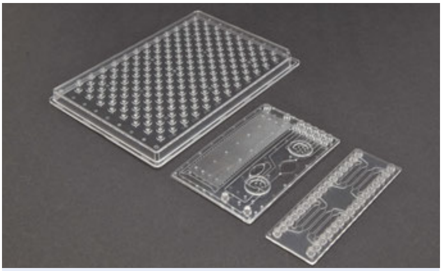


Fig. 10: Standard chip formats - microtiter plate, double slide and microscope slide formats

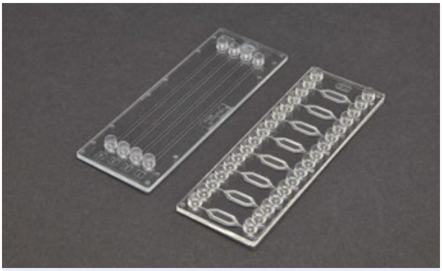


Fig. 11: Interface positioning on a slide format chip. Interfaces at the short side with lengthwise channel orientation (left) and interfaces at the long side with crosswise chamber orientation (right)

The right accessories

A microfluidic experiment requires in most cases a lot more than just the microfluidic chip. *microfluidic ChipShop* offers a variety of connectors and tubing that have been particularly designed to be used with most of our off-the-shelf standard chips. Please refer to Chapter 8 to find exactly the accessories you need for your experiment.

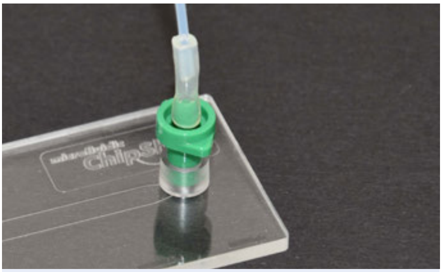


Fig. 12: A Luer connector mounted on a Luer interface with attached tubing

Fig. 13: Liquid storage, chip positioning and connection - accessories serve many purposes

Surface modification

Thermoplastic materials are natively hydrophobic with water contact angles >80°. However, most of our off-the-shelf chips can also be purchased as hydrophilized versions, which have undergone a physical hydrophilization process.

Chip handling

We recommend to wear gloves at all times, when handling microfluidic chips. This precaution will ensure prolonged chip tentability by preventing unwanted contamination or stains.

3.2 Straight channel chips – Microscope slide format

On the format of a microscope slide (75.5 mm x 25.5 mm x 1.5 mm), microfluidic channels in various widths and depths are available. The channel distance from center to center is 4.5 mm according to the spacing of a 384 microtiter plate. The fluidic chips are available with simple through-holes fitting to normal pipette tips, and Mini Luer interfaces that can be used with the respective counterpart. Alternatively, standard Luer interfaces are convenient, as are olives integrated on the chip to be directly connected with silicone tubings, for example. Channels can be orientated crosswise or lengthwise on the chip.

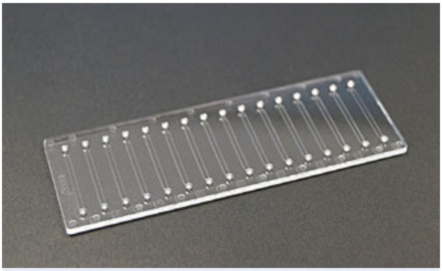


Fig. 14: Microfluidic chip – 16-channel through-hole chip family with crosswise channels

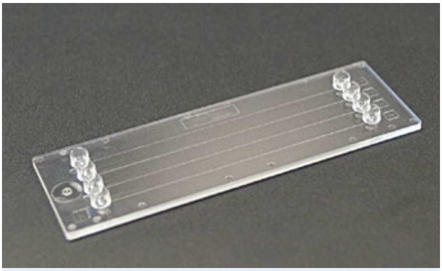


Fig. 15: Microfluidic chip – 4-channel Mini Luer chip family with lengthwise channels

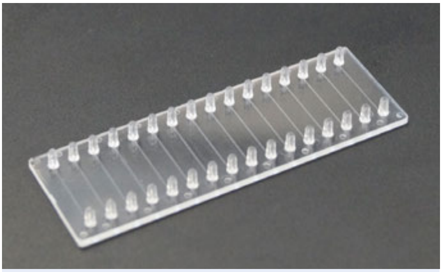


Fig. 16: Microfluidic chip – 16-channel Olives chip family

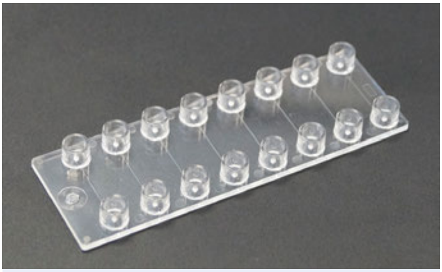


Fig. 17: Microfluidic chip – 8-channel Luer chip family

3.2.1 Straight channel chips – Channel orientation: lengthwise

3.2.1.1 Straight channel chips – Channel orientation: lengthwise Fluidic interface: Through-holes

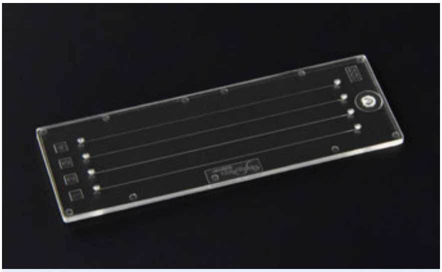


Fig. 18: Four-channel through-hole chip family with lengthwise channel orientation

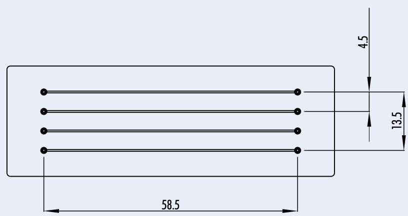


Fig. 19: Details of the four-channel through-hole chip family

Product Code	Fluidic	Number of Channels	Channel Width [µm]	Channel Depth [µm]	Channel Length [mm]	Cover Lid Thickness [µm]	Material	Price [€/chip] 1+	Price [€/chip] 10+	Price [€/chip] 30+
10001806	143	4	20	20	58.5	175	PMMA	42.50	31.20	23.50
10000037	143	4	20	20	58.5	140	Topas	42.50	31.20	23.50
10001833	145	4	50	50	58.5	175	PMMA	42.50	31.20	23.50
10000192	145	4	50	50	58.5	140	Topas	42.50	31.20	23.50
10000193	144	4	100	100	58.5	175	PMMA	42.50	31.20	23.50
10000194	144	4	100	100	58.5	140	Topas	42.50	31.20	23.50
10000185	156	4	200	200	58.5	175	PMMA	36.20	24.30	18.10
10000186	156	4	200	200	58.5	140	Topas	36.20	24.30	18.10
10001832	180	4	800	20	58.5	175	PMMA	36.20	24.30	18.10
10000190	180	4	800	20	58.5	140	Topas	36.20	24.30	18.10
10000187	138	4	1,000	200	58.5	175	PMMA	36.20	24.30	18.10
10000188	138	4	1,000	200	58.5	140	Topas	36.20	24.30	18.10

3.2.1.2 Straight channel chips – Channel orientation: lengthwise – Fluidic interface: Olives

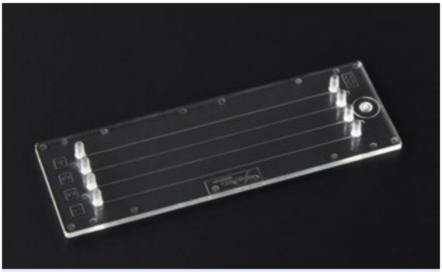


Fig. 20: 4-channel olive chip family with lengthwise channel orientation

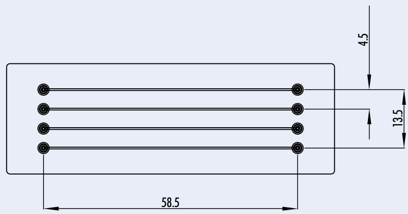


Fig. 21: Details of the 4-channel olive chip family

Product Code	Fluidic	Number of Channels	Channel Width [µm]	Channel Depth [µm]	Channel Length [mm]	Cover Lid Thickness [µm]	Material	Price [€/chip] 1+	Price [€/chip] 10+	Price [€/chip] 30+
10000207	143	4	20	20	58.5	175	PMMA	42.50	31.20	23.50
10000208	143	4	20	20	58.5	140	Topas	42.50	31.20	23.50
10001838	145	4	50	50	58.5	175	PMMA	42.50	31.20	23.50
10000210	145	4	50	50	58.5	140	Topas	42.50	31.20	23.50
10000211	144	4	100	100	58.5	175	PMMA	42.50	31.20	23.50
10000212	144	4	100	100	58.5	140	Topas	42.50	31.20	23.50
10001841	156	4	200	200	58.5	175	PMMA	36.20	24.30	18.10
10000214	156	4	200	200	58.5	140	Topas	36.20	24.30	18.10
10001842	180	4	800	20	58.5	175	PMMA	36.20	24.30	18.10
10000216	180	4	800	20	58.5	140	Topas	36.20	24.30	18.10
10000217	138	4	1,000	200	58.5	175	PMMA	36.20	24.30	18.10
10000218	138	4	1,000	200	58.5	140	Topas	36.20	24.30	18.10

3.2.1.3 Straight channel chips – Channel orientation: lengthwise Fluidic interface: Mini Luer

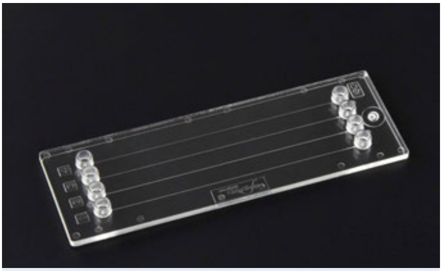


Fig. 22: Four-channel Mini Luer chip family

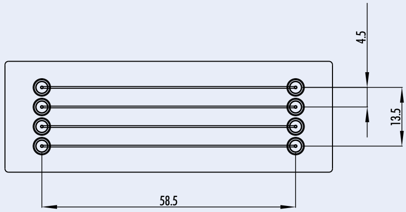


Fig. 23: Details of the four-channel Mini Luer chip family

Product Code	Fluidic	Number of Channels	Channel Width [µm]	Channel Depth [µm]	Channel Length [mm]	Cover Lid Thickness [µm]	Material	Price [€/chip] 1+	Price [€/chip] 10+	Price [€/chip] 30+
10001807	143	4	20	20	58.5	175	PMMA	42.50	31.20	23.50
10000039	143	4	20	20	58.5	140	Topas	42.50	31.20	23.50
10001814	145	4	50	50	58.5	175	PMMA	42.50	31.20	23.50
10000087	145	4	50	50	58.5	140	Topas	42.50	31.20	23.50
10001815	144	4	100	100	58.5	175	PMMA	42.50	31.20	23.50
10000089	144	4	100	100	58.5	140	Topas	42.50	31.20	23.50
10001816	156	4	200	200	58.5	175	PMMA	36.20	24.30	18.10
10000091	156	4	200	200	58.5	140	Topas	36.20	24.30	18.10
10000108	180	4	800	20	58.5	175	PMMA	36.20	24.30	18.10
10000109	180	4	800	20	58.5	140	Topas	36.20	24.30	18.10
10001818	138	4	1,000	200	58.5	175	PMMA	36.20	24.30	18.10
10000107	138	4	1,000	200	58.5	140	Topas	36.20	24.30	18.10

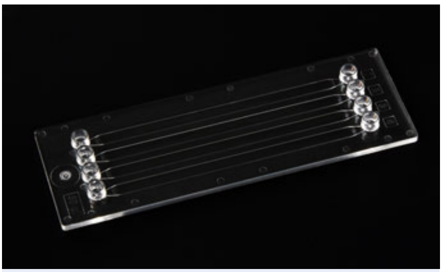


Fig. 24: Four-channel Mini Luer chip Fluidic 560

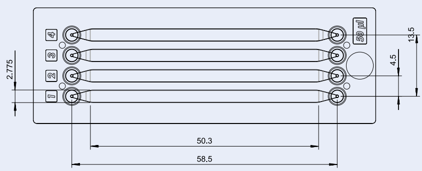


Fig. 25: Channel chip Fluidic 560 with a total channel volume of 50 µl

Product Code for Fluidic 560	Number of Channels	Channel Volume [µl]	Channel Width [µm]	Channel Depth [µm]	Channel Length [mm]	Lid Thickness [µm]	Material	Surface Treatment	Price [€/chip] 1+	10+	100+
10000571	4	50	2,775	350	58.5	140	Topas	-	36.20	24.30	16.10
10000572	4	50	2,775	350	58.5	175	PC	-	36.20	24.30	16.10
10000830	4	50	2,775	350	58.5	188	Zeonor	-	36.20	24.30	16.10
10000831	4	50	2,775	350	58.5	125	PS	-	36.20	24.30	16.10
10000574	4	50	2,775	350	58.5	140	Topas	hydrophilized	39.20	26.30	17.80
10000575	4	50	2,775	350	58.5	175	PC	hydrophilized	39.20	26.30	17.80
10000576	4	50	2,775	350	58.5	188	Zeonor	hydrophilized	39.20	26.30	17.80
10000940	4	50	2,775	350	58.5	125	PS	hydrophilized	39.20	26.30	17.80

3.2.1.4 Straight channel chips – Channel orientation: lengthwise – Fluidic interface: Luer

Fig. 26: Schematic drawing of Fluidic 268, one channel chip with Luer interface

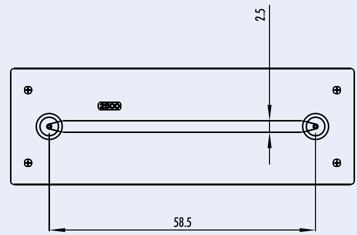


Fig. 27: Details of the one channel chip with Luer interface

Product Code for Fluidic 268	Number of Channels	Channel Width [µm]	Channel Depth [µm]	Channel Length [mm]	Lid Thickness [µm]	Material	Surface treatment	Price [€/chip] 1+	10+	100+
10001849	1	2,500	150	58.5	175	PMMA	-	36.20	24.30	18.10
10000247	1	2,500	150	58.5	188	Zeonor	-	36.20	24.30	18.10
10001134	1	2,500	150	58.5	140	Topas	-	36.20	24.30	18.10
10000249	1	2,500	150	58.5	175	PMMA	hydrophilized	46.20	29.30	19.98
10000248	1	2,500	150	58.5	188	Zeonor	hydrophilized	46.20	29.30	19.98
10001135	1	2,500	150	58.5	140	Topas	hydrophilized	46.20	29.30	19.98

3.2.2 Straight channel chips – Channel orientation: crosswise

3.2.2.1 Straight channel chips – Channel orientation: crosswise Fluidic interface: Through-holes

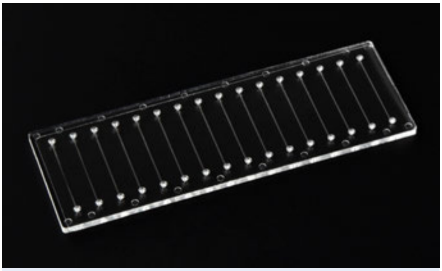


Fig. 28: 16-channel through-hole chip family with crosswise channel orientation

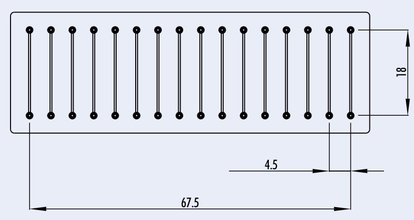


Fig. 29: Details of the 16-channel through-hole chip family

Product Code	Fluidic	Number of Channels	Channel Width [µm]	Channel Depth [µm]	Channel Length [mm]	Cover Lid Thickness [µm]	Material	Price [€/chip] 1+	10+	30+
10000195	142	16	200	100	18.0	175	PMMA	36.20	24.30	18.10
10000196	142	16	200	100	18.0	140	Topas	36.20	24.30	18.10
10000197	152	16	1,000	200	18.0	175	PMMA	36.20	24.30	18.10
10000198	152	16	1,000	200	18.0	140	Topas	36.20	24.30	18.10

3.2.2.2 Straight channel chips – Channel orientation: crosswise – Fluidic interface: Olives

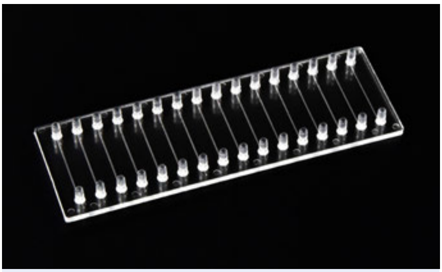


Fig. 30: 16-channel olive chip family

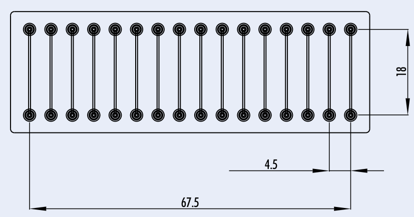


Fig. 31: Details of the 16-channel olive chip family

Product Code	Fluidic	Number of Channels	Channel Width [µm]	Channel Depth [µm]	Channel Length [mm]	Cover Lid Thickness [µm]	Material	Price [€/chip] 1+	10+	30+
10001855	142	16	200	100	18.0	175	PMMA	36.20	24.30	18.10
10000276	142	16	200	100	18.0	140	Topas	36.20	24.30	18.10
10000277	152	16	1,000	200	18.0	175	PMMA	36.20	24.30	18.10
10000278	152	16	1,000	200	18.0	140	Topas	36.20	24.30	18.10

3.2.2.3 Straight channel chips – Channel orientation: crosswise – Fluidic interface: Mini Luer

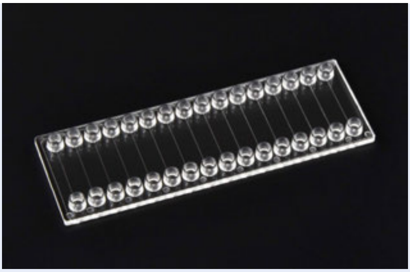


Fig. 32: 16-channel Mini Luer chip family

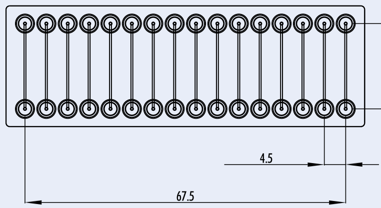


Fig. 33: Details of the 16-channel Mini Luer chip family

Product Code	Fluidic	Number of Channels	Channel Width [µm]	Channel Depth [µm]	Channel Length [mm]	Cover Lid Thickness [µm]	Material	Price [€/chip] 1+	Price [€/chip] 10+	Price [€/chip] 30+
10000065	142	16	200	100	18.0	175	PMMA	36.20	24.30	18.10
10000066	142	16	200	100	18.0	140	Topas	36.20	24.30	18.10
10000067	152	16	1,000	200	18.0	175	PMMA	36.20	24.30	18.10
10000068	152	16	1,000	200	18.0	140	Topas	36.20	24.30	18.10

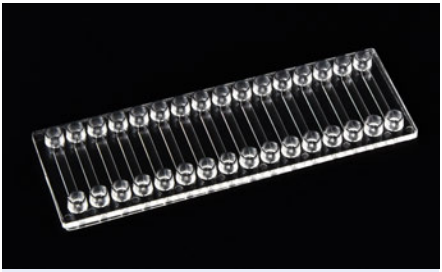


Fig. 34: 16-channel chip Fluidic 561 with Mini Luer interfaces

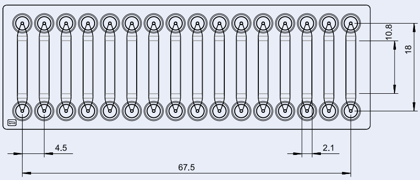


Fig. 35: Channel chip Fluidic 561 with a total channel volume of 10 µl and a channel depth of 350 µm

Product Code for Fluidic 561	Number of Channels	Channel Volume [µl]	Channel Width [µm]	Channel Depth [µm]	Channel Length [mm]	Lid Thickness [µm]	Material	Surface Treatment	Price [€/chip] 1+	Price [€/chip] 10+	Price [€/chip] 100+
10000535	16	10	2,100	350	18.0	140	Topas	-	36.20	24.30	16.10
10000536	16	10	2,100	350	18.0	175	PC	-	36.20	24.30	16.10
10000537	16	10	2,100	350	18.0	188	Zeonor	-	36.20	24.30	16.10
10000538	16	10	2,100	350	18.0	140	Topas	hydrophilized	39.20	26.30	17.80
10000539	16	10	2,100	350	18.0	175	PC	hydrophilized	39.20	26.30	17.80
10000540	16	10	2,100	350	18.0	188	Zeonor	hydrophilized	39.20	26.30	17.80

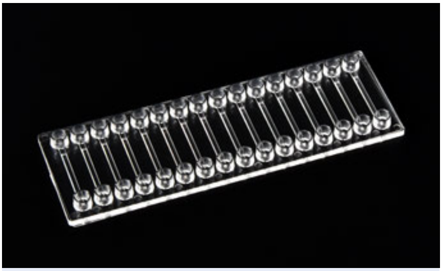


Fig. 36: 16-channel chip Fluidic 558 with Mini Luer interfaces

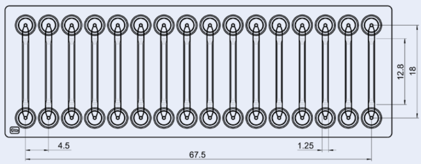


Fig. 37: Channel chip Fluidic 558 with a total channel volume of 10 μl and a channel depth of 700 μm

Product Code for Fluidic 558	Number of Channels	Channel Volume [µl]	Channel Width [µm]	Channel Depth [µm]	Channel Length [mm]	Lid Thickness [µm]	Material	Surface Treatment	Price [€/chip] 1+	Price [€/chip] 10+	Price [€/chip] 100+
10000541	16	10	1,250	700	18.0	140	Topas	-	36.20	24.30	16.10
10000542	16	10	1,250	700	18.0	175	PC	-	36.20	24.30	16.10
10000543	16	10	1,250	700	18.0	188	Zeonor	-	36.20	24.30	16.10
10000544	16	10	1,250	700	18.0	140	Topas	hydrophilized	39.20	26.30	17.80
10000545	16	10	1,250	700	18.0	175	PC	hydrophilized	39.20	26.30	17.80
10000546	16	10	1,250	700	18.0	188	Zeonor	hydrophilized	39.20	26.30	17.80

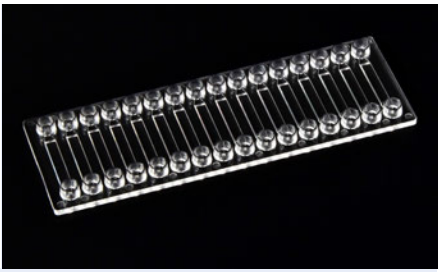


Fig. 38: 16-channel chip Fluidic 556 with Mini Luer interfaces

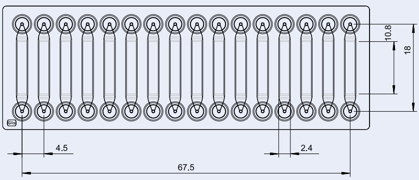


Fig. 39: Channel chip Fluidic 556 with a total channel volume of 20 μl and a channel depth of 700 μm

Product Code for Fluidic 556	Number of Channels	Channel Volume [µl]	Channel Width [µm]	Channel Depth [µm]	Channel Length [mm]	Lid Thickness [µm]	Material	Surface Treatment	Price [€/chip] 1+	Price [€/chip] 10+	Price [€/chip] 100+
10000565	16	20	2,400	700	18.0	140	Topas	-	36.20	24.30	16.10
10000566	16	20	2,400	700	18.0	175	PC	-	36.20	24.30	16.10
10000567	16	20	2,400	700	18.0	188	Zeonor	-	36.20	24.30	16.10
10000568	16	20	2,400	700	18.0	140	Topas	hydrophilized	39.20	26.30	17.80
10000569	16	20	2,400	700	18.0	175	PC	hydrophilized	39.20	26.30	17.80
10000570	16	20	2,400	700	18.0	188	Zeonor	hydrophilized	39.20	26.30	17.80

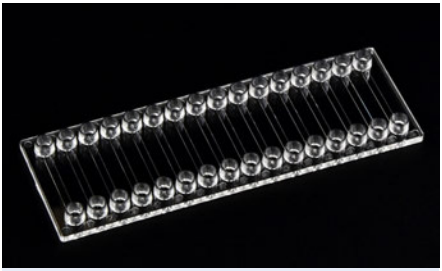


Fig. 40: 16-channel chip Fluidic 1023 with Mini Luer interfaces

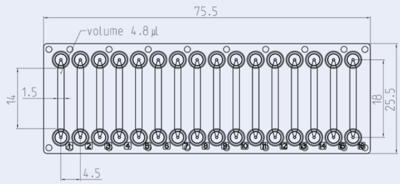


Fig. 41: Channel chip Fluidic 1023 with a channel depth of 200 µm

Product Code for Fluidic 1023	Number of Channels	Channel Depth [µm]	Channel Width [µm]	Channel Length [mm]	Lid Thickness [µm]	Material	Surface Treatment	Price [€/chip] 1+	Price [€/chip] 10+	Price [€/chip] 100+
10002046	16	200	1,500	18.0	188	Zeonor	-	36.20	24.30	18.10
10002093	16	200	1,500	18.0	188	Zeonor	hydrophilized	39.20	26.30	19.80

3.2.2.4 Straight channel chips – Channel orientation: crosswise – Fluidic interface: Luer

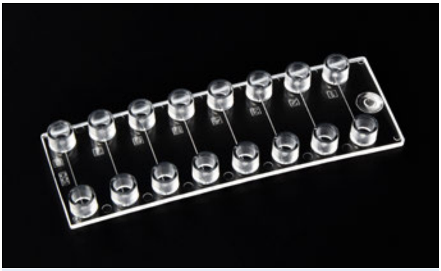


Fig. 42: Eight-channel Luer chip family with crosswise channel orientation

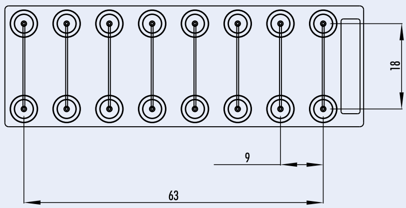


Fig. 43: Details of the eight-channel Luer chip family

Product Code	Fluidic	Number of Channels	Channel Width [µm]	Channel Depth [µm]	Channel Length [mm]	Cover Lid Thickness [µm]	Material	Price [€/chip] 1+	Price [€/chip] 10+	Price [€/chip] 30+
10001810	157	8	100	100	18.0	175	PMMA	42.50	31.20	23.50
10000059	157	8	100	100	18.0	140	Topas	42.50	31.20	23.50
10001811	431	8	2,910	100	18.0	175	PMMA	42.50	31.20	23.50
10000061	431	8	2,910	100	18.0	188	Zeonor	42.50	31.20	23.50
10001919	1412	8	500	100	18.0	125	PS	42.50	31.20	23.50
10001920	1412	8	500	100	18.0	140	Topas	42.50	31.20	23.50

3.2.3 Straight channel chips – Various channel depths in one chip

These straight channel chips feature a variety of channels within one chip with the same channel dimensions besides the channel depth. The varying channel depth and the resulting different channel volumes allow for direct comparison of the channel depth influence on the assay and the measurement. These chips are the perfect tools to help choosing the right channel dimensions in the design process of integrated microfluidic devices.

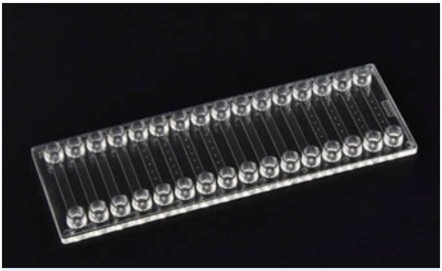


Fig. 44: Channel chip Fluidic 625 with 16 parallel channels with 2 mm width

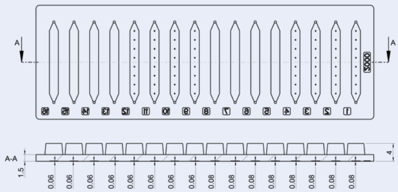


Fig. 45: Schematic cross-section of reaction chamber chip Fluidic 625. The chip contains 8 channels with 80 μm depth and 8 channels of 60 μm depth

Product Code for Fluidic 625	Chamber Volume [μl]	Chamber Depth [μm]	Lid Thickness [μm]	Material	Surface Treatment	Price [€/chip] 1+	10+	100+
10000767	8 x 2.5	8 x 60	140	Topas	-	36.20	24.30	16.10
	8 x 1.9	8 x 80						
10000768	8 x 2.5	8 x 60	140	Topas	hydrophilized	39.20	26.30	17.80
	8 x 1.9	8 x 80						

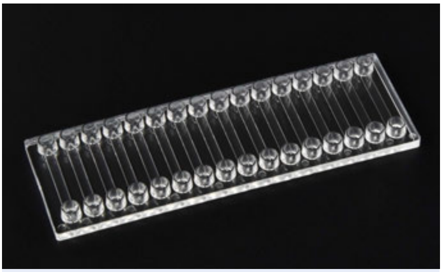


Fig. 46: Channel chip Fluidic 620 with 16 parallel channels with 2 mm width

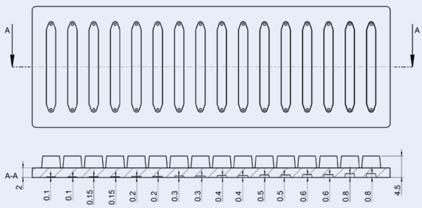


Fig. 47: Schematic drawing of channel chip Fluidic 620 with varying channel depth

Product Code for Fluidic 620	Number of Channels	Channel Volume [μl]	Channel Depth [μm]	Channel Length [mm]	Lid Thickness [μm]	Material	Surface Treatment	Price [€/chip] 1+	10+	100+
10000583	16	3.6 – 28.8	100 - 800	18.0	175	PMMA	-	36.20	24.30	16.10
10000584	16	3.6 – 28.8	100 - 800	18.0	140	Topas	-	36.20	24.30	16.10
10000585	16	3.6 – 28.8	100 - 800	18.0	125	PS	-	36.20	24.30	16.10
10000586	16	3.6 – 28.8	100 - 800	18.0	175	PMMA	hydrophilized	39.20	26.30	17.80
10000587	16	3.6 – 28.8	100 - 800	18.0	140	Topas	hydrophilized	39.20	26.30	17.80
10000588	16	3.6 – 28.8	100 - 800	18.0	125	PS	hydrophilized	39.20	26.30	17.80

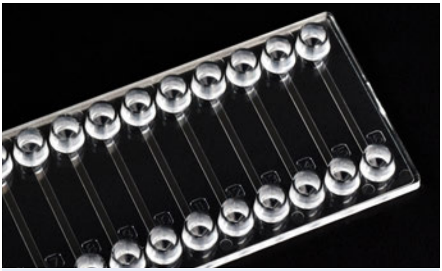


Fig. 48: Channel array chip Fluidic 1340 with Mini Luer interface

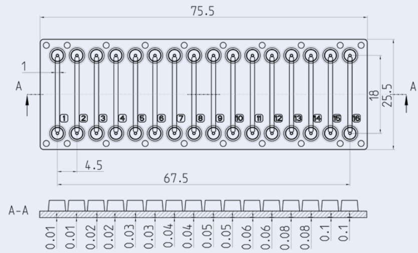


Fig. 49: Schematic drawing of channel array chip Fluidic 1340 with varying channel depth

Product Code for Fluidic 1340	Channel Lenght [mm]	Channel Depth [µm]	Lid Thickness [µm]	Material	Surface Treatment	Price [€/chip] 1+	Price [€/chip] 10+	Price [€/chip] 100+
10002054	18.0	10 - 100	125	PS	-	42.20	34.40	26.10
10002056	18.0	10 - 100	140	Topas	-	42.20	34.40	26.10
10002055	18.0	10 - 100	125	PS	hydrophilized	45.20	36.40	27.80
10002057	18.0	10 - 100	140	Topas	hydrophilized	45.20	36.40	27.80

3.3 Straight channel chips – Microtiter-plate format

The SBS titer-plate format (85.48 mm x 127.76 mm) is a worldwide standard used by almost all pieces of equipment in the laboratory. A family of microfluidic microtiter plates having the spacing of the fluidic access holes of the laboratory standard and being compatible with the respective readers allows for a wide variety of different assays, including cell-based assays, hybridization assays, or small volume chemical synthesis. The channels can easily be filled via pipetting in the through-hole interfaces.

The plates are available in various polymer materials like PC, PS, PMMA, or COP (Zeonor), either in its native state or hydrophilically primed for self-filling of the microchannels with aqueous solutions. It is possible to include surface functionalization in the channels like the spotting of DNA probes, poly-L-lysin or collagen coating, etc.

To easily integrate a microfluidic development into existing lab environments, we have developed a microfluidic platform with the outer dimensions of a standard microtiter plate.

3.3.1 Straight channel chips – Microtiter-plate format – 64 channel plates

The plate is equipped with four labeled sets of 16 microchannels each, with the dimensions 2 mm width, 150 µm height, and 18 mm length. Fluidic access is easily provided by conical openings of 2.5 mm diameter at either channel end.

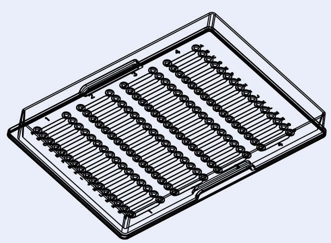


Fig. 50: Schematic drawing of the microfluidic titer plate

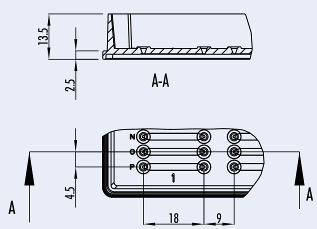


Fig. 51: Details of the microfluidic titer plate

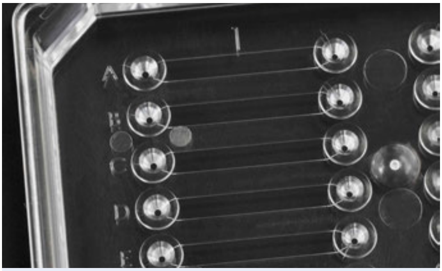


Fig. 52: Detail of microfluidic titer plate

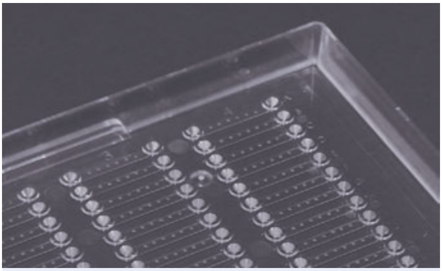


Fig. 53: Microfluidic titer plate with spotted probes

Product Code for Fluidic 102	Channel Dimensions Width [mm]	Depth [mm]	Length [mm]	Material	Lid Thickness [µm]	Surface Treatment	Price [€/chip] 1+	10+	30+
10001873	2	0.15	18	PMMA	175	-	79.00	59.00	29.00
10000353	2	0.15	18	PC	175	-	79.00	59.00	29.00
10000335	2	0.15	18	PS	125	-	79.00	59.00	29.00
10000320	2	0.15	18	Zeonor	188	-	79.00	59.00	29.00
10001890	2	0.15	18	PMMA	175	hydrophilized	98.00	78.00	38.00
10000647	2	0.15	18	PC	175	hydrophilized	98.00	78.00	38.00
10000364	2	0.15	18	PS	125	hydrophilized	98.00	78.00	38.00
10000649	2	0.15	18	Zeonor	188	hydrophilized	98.00	78.00	38.00

3.3.2 Straight channel chips – Microtiter-plate format – 96 channel plates

These microfluidic microtiter plate devices are designed to have the fluidic access holes at the positions of a 384 well plate having a 4.5 mm spacing. Read out positions comply with the positions of 96 well plate readers.

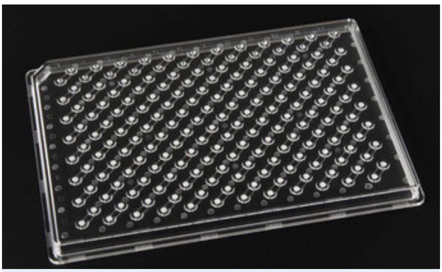


Fig. 54: Microfluidic microtiter plate top view – Fluidic 600 – 150 µm channel depth

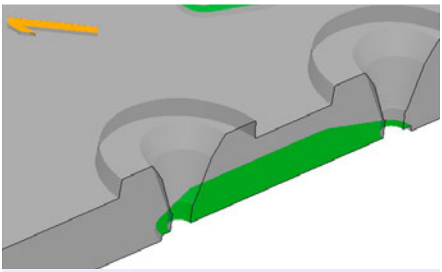


Fig. 55: Detail of the microfluidic microtiter plate with 1.9 µl channel volume – Fluidic 600 – 150 µm channel depth

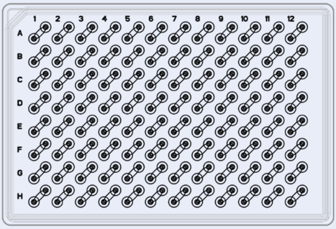


Fig. 56: Schematic drawing of the microfluidic microtiter plate top view – Fluidic 627 – 600 μm channel depth

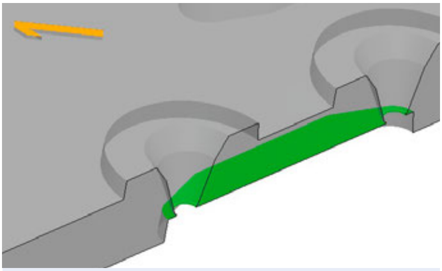


Fig. 57: Detail of the microfluidic microtiter plate with 7.6 μl channel volume – Fluidic 627 – 600 μm channel depth

Product Code for Fluidic 600	Channel Dimensions Volume [μl]	Width [mm]	Depth [mm]	Length [mm]	Material	Lid Thickness [μm]	Surface Treatment	Price [€/chip] 1+	10+	30+
10000650	1.9	2	0.15	6.364	PMMA	175	-	79.00	59.00	29.00
10000651	1.9	2	0.15	6.364	Topas	140	-	79.00	59.00	29.00
10000652	1.9	2	0.15	6.364	PC	175	-	79.00	59.00	29.00
10000653	1.9	2	0.15	6.364	PS	125	-	79.00	59.00	29.00
10000654	1.9	2	0.15	6.364	PMMA	175	hydrophilized	98.00	78.00	38.00
10000655	1.9	2	0.15	6.364	Topas	140	hydrophilized	98.00	78.00	38.00
10000656	1.9	2	0.15	6.364	PC	175	hydrophilized	98.00	78.00	38.00
10000657	1.9	2	0.15	6.364	PS	125	hydrophilized	98.00	78.00	38.00

Product Code for Fluidic 627	Channel Dimensions Volume [μl]	Width [mm]	Depth [mm]	Length [mm]	Material	Lid Thickness [μm]	Surface Treatment	Price [€/chip] 1+	10+	30+
10000658	7.6	2	0.6	6.364	PMMA	175	-	79.00	59.00	29.00
10000616	7.6	2	0.6	6.364	Topas	140	-	79.00	59.00	29.00
10000660	7.6	2	0.6	6.364	PC	175	-	79.00	59.00	29.00
10000661	7.6	2	0.6	6.364	PS	125	-	79.00	59.00	29.00
10000662	7.6	2	0.6	6.364	PMMA	175	hydrophilized	98.00	78.00	38.00
10000720	7.6	2	0.6	6.364	Topas	140	hydrophilized	98.00	78.00	38.00
10000664	7.6	2	0.6	6.364	PC	175	hydrophilized	98.00	78.00	38.00
10000665	7.6	2	0.6	6.364	PS	125	hydrophilized	98.00	78.00	38.00

3.4 Channel chips with metering function - Volume test chips

The volume test chips are designed for precise and controlled fluid handling at the microscale. These chips feature straight channels with measurement scales integrated into their design, allowing for accurate monitoring of the filling volume. The volume test chip is available as Fluidic 1474 with one channel or as Fluidic 1475 with three parallel channels.

Please note: Fluidic 1475 features membrane valve structures directly after the inlet channel splits into the three channel sections. For full functionality, the valves of the unused channels need to be closed with a customized actuator. Please reach out to *microfluidic ChipShop* for more information on customized options.

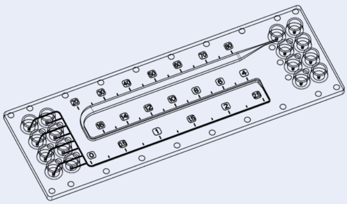


Fig. 58: Volume test chip with one channel Fluidic 1474

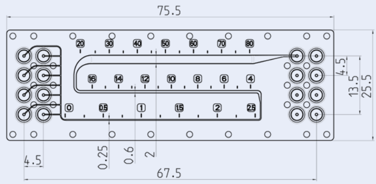


Fig. 59: Schematic drawing of Fluidic 1474

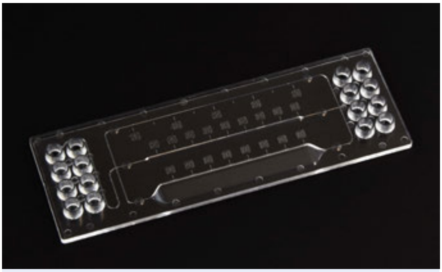


Fig. 60: Volume test chip with three different channels Fluidic1475

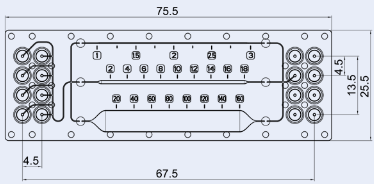


Fig. 61: Schematic drawing of Fluidic 1475

Product Code	Fluidic	Description	Material	Lid Thickness [µm]	Price [€/chip]		
					1+	10+	100+
10002059	1474	Volume test chip - One channel	Topas	140	42.20	34.40	26.10
10002060	1475	Volume test chip - Three channels	Topas	140	42.20	34.40	26.10

3.5 Cross-shaped channel chips

A variety of chips with crossing channels either with T or double-T junctions is offered in this chapter. Different outer formats ranging from the microscopy slide format, 25.5 mm x 75.5 mm, to extended size platforms with 95.5 mm x 16 mm x 1.5 mm or 141 mm x 16 mm x 1.5 mm respectively are possible. The maximum available standard channel length is 120 mm. As fluidic interfaces, simple through-holes for the filling with pipettes or female Luer adapters are available. One of the most common applications of this chip category is the use in capillary electrophoresis.

3.5.1 Cross-shaped channel chips – Extended size plaform I

3.5.1.1 Cross-shaped channel chips – Extended size platform I Fluidic interface: Through-holes

Fig. 62: Cross-shaped channel chip

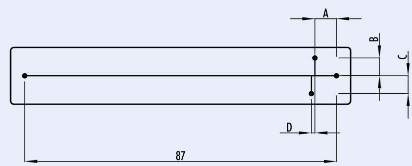


Fig. 63: Details of the cross-shaped channel chips

Product Code	Fluidic	Channel Width [µm]	Channel Depth [µm]	Channel Length [mm]	Hole Diameter [mm]	Geometry A [mm]	Geometry B [mm]	Geometry C [mm]	Geometry D [mm]	Lid Thickness [µm]	Material	Price [€/chip] 1+	10+	100+	1000+
10001826	82	50	50	87.0	1.0	6.0	5.0	5.0	0	175	PMMA	42.35	31.19	25.18	9.98
10000169	82	50	50	87.0	1.0	6.0	5.0	5.0	0	140	Topas	42.35	31.19	25.18	9.98
10000170	201	50	50	87.0	1.0	6.0	5.0	5.0	0.1	175	PMMA	42.35	31.19	25.18	9.98
10000171	201	50	50	87.0	1.0	6.0	5.0	5.0	0.1	140	Topas	42.35	31.19	25.18	9.98
10001828	106	75	75	87.0	1.0	6.0	5.0	5.0	0	175	PMMA	42.35	31.19	25.18	9.98
10000173	106	75	75	87.0	1.0	6.0	5.0	5.0	0	140	Topas	42.35	31.19	25.18	9.98
10001802	166	100	100	87.0	1.0	6.0	5.0	5.0	0	175	PMMA	42.35	31.19	25.18	9.98
10000167	166	100	100	87.0	1.0	6.0	5.0	5.0	0	140	Topas	42.35	31.19	25.18	9.98

3.5.1.2 Cross-shaped channel chips – Extended size platform I
Fluidic interface: Luer

Fig. 64: Cross-shaped channel chip

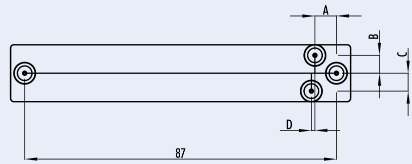


Fig. 65: Details of the cross-shaped channel chips with Luer interfaces

Fig. 66: Detail of the cross-shaped channel chip with Luer interfaces

Fig. 67: Cross-shaped channel chip with female Luer interface and a syringe as male counterpart

Product Code	Fluidic	Channel Width [µm]	Channel Depth [µm]	Channel Length [mm]	Hole-Diameter [mm]	Geometry A [mm]	Geometry B [mm]	Geometry C [mm]	Geometry D [mm]	Lid Thickness [µm]	Material	Price [€/chip] 1+	10+	100+	1000+
10000322	82	50	50	87.0	1.0	6.0	5.0	5.0	0	175	PMMA	42.35	31.19	25.18	9.98
10000272	82	50	50	87.0	1.0	6.0	5.0	5.0	0	140	Topas	42.35	31.19	25.18	9.98
10000290	82	50	50	87.0	1.0	6.0	5.0	5.0	0	100	Zeonor	42.35	31.19	25.18	9.98
10000273	201	50	50	87.0	1.0	6.0	5.0	5.0	0.1	175	PMMA	42.35	31.19	25.18	9.98
10000259	201	50	50	87.0	1.0	6.0	5.0	5.0	0.1	140	Topas	42.35	31.19	25.18	9.98
10000263	201	50	50	87.0	1.0	6.0	5.0	5.0	0.1	100	Zeonor	42.35	31.19	25.18	9.98
10000316	106	75	75	87.0	1.0	6.0	5.0	5.0	0	175	PMMA	42.35	31.19	25.18	9.98
10000317	106	75	75	87.0	1.0	6.0	5.0	5.0	0	140	Topas	42.35	31.19	25.18	9.98
10000318	106	75	75	87.0	1.0	6.0	5.0	5.0	0	100	Zeonor	42.35	31.19	25.18	9.98
10000329	202	75	75	87.0	1.0	6.0	5.0	5.0	0.1	175	PMMA	42.35	31.19	25.18	9.98
10000330	202	75	75	87.0	1.0	6.0	5.0	5.0	0.1	140	Topas	42.35	31.19	25.18	9.98
10000264	202	75	75	87.0	1.0	6.0	5.0	5.0	0.1	100	Zeonor	42.35	31.19	25.18	9.98
10001852	166	100	100	87.0	1.0	6.0	5.0	5.0	0	175	PMMA	42.35	31.19	25.18	9.98
10000258	166	100	100	87.0	1.0	6.0	5.0	5.0	0	140	Topas	42.35	31.19	25.18	9.98
10000237	166	100	100	87.0	1.0	6.0	5.0	5.0	0	100	Zeonor	42.35	31.19	25.18	9.98

Product Code	Fluidic	Channel Width [µm]	Channel Depth [µm]	Channel Length [mm]	Hole-Diameter [mm]	Geometry A [mm]	Geometry B [mm]	Geometry C [mm]	Geometry D [mm]	Lid Thickness [µm]	Material	Price [€/chip] 1+	10+	100+	1000+
10000232	394	200	200	87.0	1.0	6.0	5.0	5.0	0	175	PMMA	42.35	31.19	25.18	9.98
10000016	394	200	200	87.0	1.0	6.0	5.0	5.0	0	140	Topas	42.35	31.19	25.18	9.98
10000233	394	200	200	87.0	1.0	6.0	5.0	5.0	0	100	Zeonor	42.35	31.19	25.18	9.98
10000234	395	400	200	87.0	1.0	6.0	5.0	5.0	0	175	PMMA	42.35	31.19	25.18	9.98
10000235	395	400	200	87.0	1.0	6.0	5.0	5.0	0	140	Topas	42.35	31.19	25.18	9.98
10000236	395	400	200	87.0	1.0	6.0	5.0	5.0	0	100	Zeonor	42.35	31.19	25.18	9.98

3.5.1.3 Cross-shaped channel chips – Extended size platform I Fluidic interface: Thread for LabSmith interfaces

This cross shaped channel chip design includes integrated threads in all fluidic interface in order to allow to screw in the respective LabSmith one piece fittings (product code: 10000404). These fittings allow for high pressure connections.

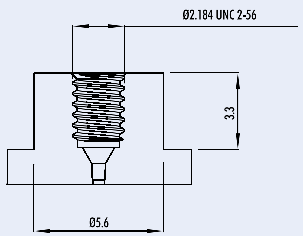


Fig. 68: Detail of thread in cross-shaped channel chip fluidic interface

Fig. 69: Cross-shaped channel chips with embedded threads that can be connect with LabSmith's fittings

Product Code	Fluidic	Description	Material	Price [€] 1+	10+
10001829	106	Cross-shaped channel chip with threads in the fluidic interface to connect with LabSmith one piece fitting (10000404)	PMMA	62.40	43.60

3.5.2 Cross-shaped channel chips – Extended size plaform I with electrodes

3.5.2.1 Cross-shaped channel chips – Extended size platform I with electrodes (contact mode) Fluidic interface: Through-holes

This variation of the cross-shaped channel chips includes electrodes that can be used for the detection of charged molecules, for example. The material of the electrodes is 10 nm titanium and 100–150 nm gold. The electrodes are placed on the cover lid and assembled towards the channel, resulting in a direct contact of the electrode material with the liquid to be analyzed.

Fig. 70: Cross-shaped channel chip with electrodes

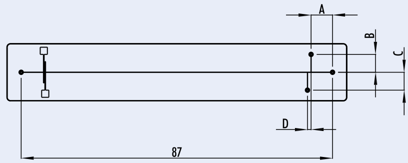


Fig. 71: Detail of cross-shaped channel chip with electrodes

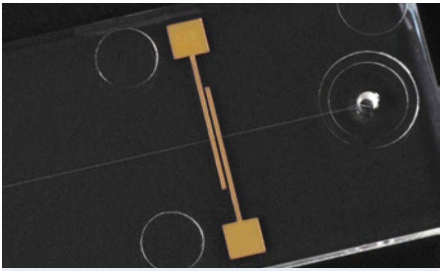


Fig. 72: Details of the electrodes

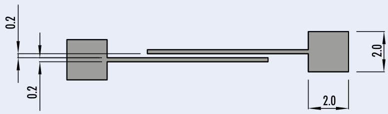


Fig. 73: Details of the electrodes

Product Code	Fluidic	Channel Width [µm]	Channel Depth [µm]	Channel Length [mm]	Hole Diameter [mm]	Geometry A [mm]	B	C	D	E	Lid Thickness [µm]	Material	Price [€/chip] 1+	10+
10001857	82	50	50	87.8	1.0	6.0	5.0	5.0	0	0.2	175	PMMA	155.00	145.00
10001861	201	50	50	87.8	1.0	6.0	5.0	5.0	0.1	0.2	175	PMMA	155.00	145.00

3.5.2.2 Cross-shaped channel chips – Extended size platform I with electrodes (non-contact mode) – Fluidic interface: Luer

This variation of the cross-shaped channel chips includes electrodes that can be used for the detection of charged molecules, for example. The material of the electrodes is 10 nm titanium and 100–150 nm gold. The electrodes are placed on the cover lid and assembled towards the atmosphere, resulting in electrode and the liquid to be analyzed having no contact. The use of these chips with this electrode arrangement requires a special instrumentation set-up. This detection technology is called C^4D (capacitively coupled contactless conductivity detection). Chapter 10.2 highlights the respective instrument that allows for an easy use of these chips for several kinds of applications.

Please see the previous page for indication of channel geometry details (A, B, C, D) given in the table below.

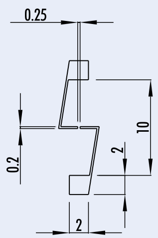


Fig. 74: Details of the electrodes

Fig. 75: Cross-shaped channel chip with electrodes for contactless conductivity detection

Product Code	Fluidic	Channel Width [µm]	Depth [µm]	Length [mm]	Hole Diameter [mm]	Geometry A [mm]	B	C	D	Lid Thickness [µm]	Material	Price [€/chip] 1+	10+	100+
10001805	82	50	50	87.0	1.0	6.0	5.0	5.0	0	60	PMMA	125.00	85.00	32.50
10001804	201	50	50	87.0	1.0	6.0	5.0	5.0	0.1	60	PMMA	125.00	85.00	32.50
1000	166	100	100	87.0	1.0	6.0	5.0	5.0	0	60	PMMA	125.00	85.00	32.50
10000338	166	100	100	87.0	1.0	6.0	5.0	5.0	0	50	Zeonor	125.00	85.00	32.50
10001969	394	200	200	87.0	1.0	6.0	5.0	5.0	0	60	PMMA	125.00	85.00	32.50
10000398	394	200	200	87.0	1.0	6.0	5.0	5.0	0	50	Zeonor	125.00	85.00	32.50
10001970	395	400	200	87.0	1.0	6.0	5.0	5.0	0	60	PMMA	125.00	85.00	32.50
10000396	395	400	200	87.0	1.0	6.0	5.0	5.0	0	50	Zeonor	125.00	85.00	32.50

3.5.3 Cross-shaped channel chips – Extended size platform II
3.5.3.1 Cross-shaped channel chips – Extended size platform II Fluidic interface: Through-holes

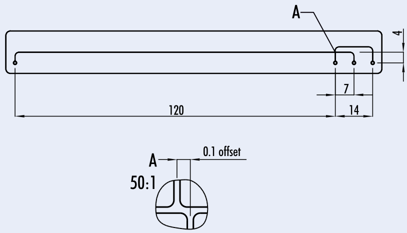


Fig. 76: Details of cross-shaped channel chip with through holes

Fig. 77: Cross-shaped channel chip with through-holes

Product Code for Fluidic 189	Channel Width [µm]	Channel Depth [µm]	Cover Lid Thickness [µm]	Material	Price [€/chip] 1+	10+	100+
10001872	50	50	175	PMMA	68.60	44.60	28.40
10000351	50	50	140	Topas	68.60	44.60	28.40

3.5.3.2 Cross-shaped channel chips – Extended size platform II Fluidic interface: Luer

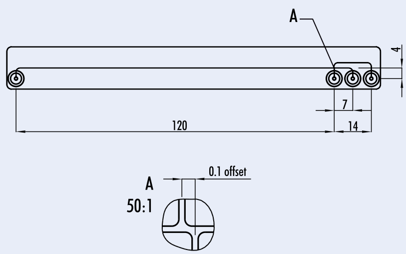


Fig. 78: Details of cross-shaped channel chip with Luer interfaces

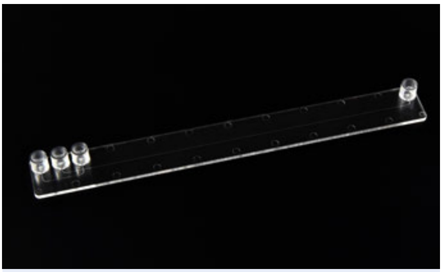


Fig. 79: Cross-shaped channel chip with Luer interfaces

Product Code for Fluidic 189	Channel Width [µm]	Channel Depth [µm]	Cover Lid Thickness [µm]	Material	Price [€/chip] 1+	10+	100+
10001871	50	50	175	PMMA	68.60	44.60	28.40
10000349	50	50	140	Topas	68.60	44.60	28.40

3.5.4 Cross-shaped channel chips – Microscopy slide format

These chips offer two separate channel structures with crossing channels on each device. One of those with, one without a channel offset. The microfluidic chips of this family feature Mini Luer interfaces.

Fig. 80: Cross-shaped channel chip fluidic 160 in the format of a microscopy slide with Mini Luer fluidic interfaces

Fig. 81: Cross-shaped channel chip fluidic 161 in the format of a microscopy slide with Mini Luer fluidic interfaces

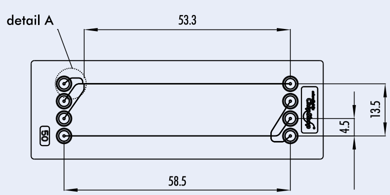


Fig. 82: Detail cross-shaped channel chip 160

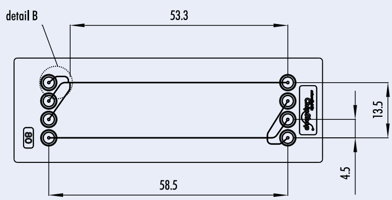


Fig. 83: Detail cross-shaped channel chip 161

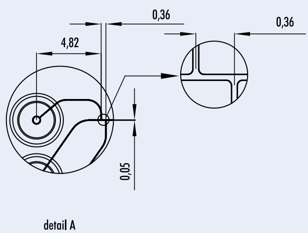


Fig. 84: Detail of channel offset in chip 160

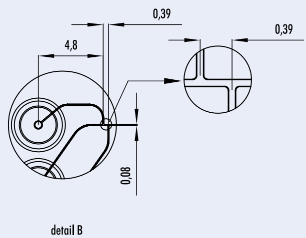


Fig. 85: Detail of channel offset in chip 161

Product Code	Fluidic	Channel Width [µm]	Channel Depth [µm]	Cover Lid Thickness [µm]	Material	Price [€/chip] 1+	10+	30+
10000325	160	50	50	175	PMMA	42.50	31.20	23.50
10000326	160	50	50	140	Topas	42.50	31.20	23.50
10000303	161	80	80	175	PMMA	42.50	31.20	23.50
10000327	161	80	80	140	Topas	42.50	31.20	23.50

3.6 H-shaped channel chips

The H-shaped channel chip family is placed on the format of a microscopy slide (75.5 mm x 25.5 mm x 1.5 mm). As fluidic interfaces, Mini Luer adapters are integrated on the chip. These chips can for example be used as extractors or to establish concentration gradients.

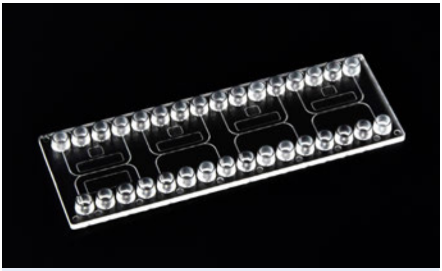


Fig. 86: H-shaped channel chip Fluidic 164

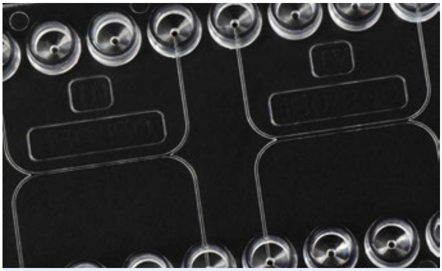


Fig. 87: Detail of H-shaped channel chip

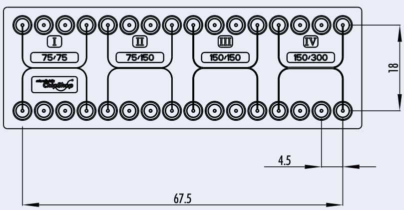


Fig. 88: Detail of H-shaped channel chip

Product Code for Fluidic 164	Channel Dimensions Width inlet & outlet / middle I [µm]	II [µm]	III [µm]	IV [µm]	All Depth [µm]	Lid Thick-ness [µm]	Mate-rial	Price [€/chip] 1+	10+	30+
10001851	75/75	75/150	150/150	150/300	75	175	PMMA	42.50	31.20	23.50
10000266	75/75	75/150	150/150	150/300	75	140	Topas	42.50	31.20	23.50

3.7 Chamber chips

Chamber chips all come in the format of a microscopy slide (75.5 mm x 25.5 mm x 1.5 mm) and are equipped with Mini Luer interfaces. Their key microfluidic elements are reaction chambers of various volumes. Chamber chips are the perfect tool to facilitate reactions, such as amplification of a targeted DNA during qPCR, or to extract target molecules out of a given sample in preparative quantities. These chips can, for example, be used as nucleic acid extraction devices via magnetic beads simply via applying beads and sample and by using an external magnet to hold the beads in place. These procedures can be done completely manually with a pipette – besides the magnet no additional equipment is necessary – or semi-automated with normal peristaltic pumps found in most life science labs.

Preloaded chips: If you are interested in chips preloaded with dried reagents for nucleic acid extraction and the respective buffer solutions, please do not hesitate to contact us.

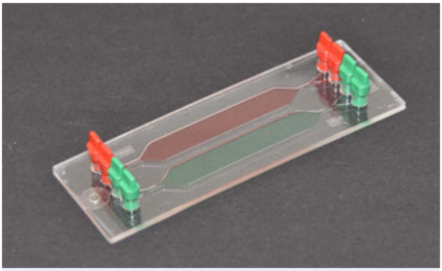


Fig. 89: Rhombic chamber chip filled

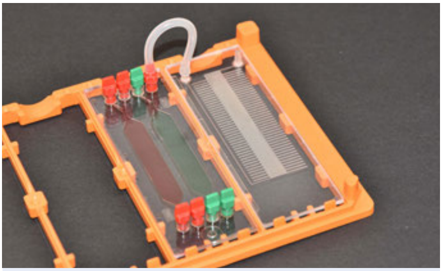


Fig. 90: Rhombic chamber chip in handling frame connected to PCR chip

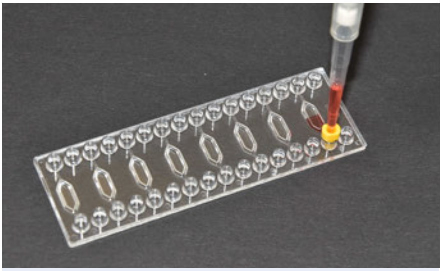


Fig. 91: A reaction chamber chip is being filled with the aid of a Mini Luer to pipette adapter

3.7.1 Chamber chip with pipetting interface

The chamber chip with Pipetting interface Fluidic 1495 comprises a total of 16 chambers, each with varying channel depths from 150 - 500 µm. In pairs, two chambers share identical dimensions and chamber volumes. What sets this chamber chip apart is the presence of a pipetting interface at the inlet of each chamber. This interface enables direct filling of the chamber using a pipette. This significantly streamlines the handling process, allowing for easy and precise pipetting of samples or liquids into the chambers, manually or via a pipetting robot, without requiring additional steps or equipment.
Additionally, the outlets of the individual chambers are equipped with Mini Luer interfaces, making them compatible with all of microfluidic ChipShop's acessories such as tanks, plugs or caps.

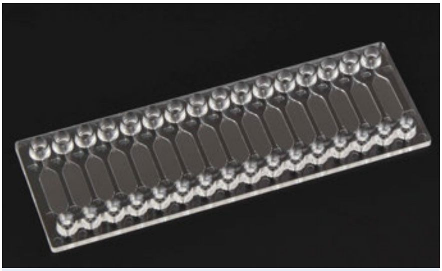


Fig. 92: Chamber chip with Pipetting interface Fluidic 1495

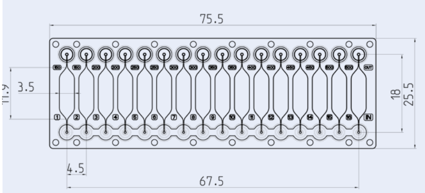


Fig. 93: Schematic drawing of Fluidic 1495 with different chamber depths

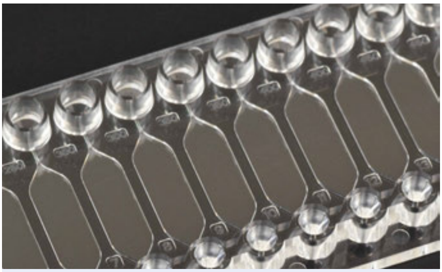


Fig. 94: Detail of chamber chip with Pipetting interfaces at the bottom and Mini Luer interfaces at the top of the picture

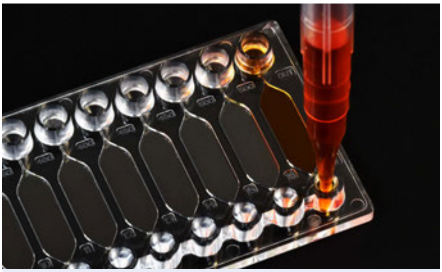


Fig. 95: Filling of the chip Fluidic 1495 using a conventional pipette

Product Code for Fluidic 1495	Chamber Depths [µm]	Lid Thickness [µm]	Material	Surface Treatment	Price [€/chip] 1+	10+	100+
10002063	150 - 500	140	Topas*	-	42.20	34.40	26.10
10002069	150 - 500	125	PS*	-	42.20	34.40	26.10
10002064	150 - 500	140	Topas*	hydrophilized	45.20	36.40	27.80
10002070	150 - 500	125	PS*	hydrophilized	45.20	36.40	27.80

* not suitable for PCR applications

3.7.2 Chamber chips – Chamber orientation: lengthwise

3.7.2.1 Chamber chips – Chamber orientation: lengthwise - Rhombic chamber chips

As the name suggests this chip family features one or more rhombic chambers on each chip. Those chambers all posses both two inlets and two outlets. Furthermore, this chip family is tailored to be used with our on-chip sample preparation instrument ChipGenie® edition P. For further information please refer to Chapter 10.3, page 227.

Fig. 96: Rhombic chamber chip Fluidic 221

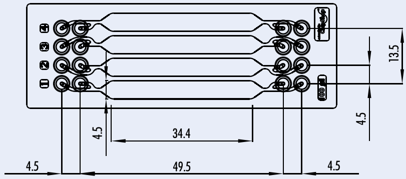


Fig. 97: Rhombic chamber chip – 100 µl chamber volume

Product Code for Fluidic 221	Chamber Volume [µl]	Chamber Depth [µm]	Lid Thickness [µm]	Material	Surface Treatment	Price [€/chip] 1+	10+	100+
10000046	100	600	175	PMMA*	-	36.20	24.30	16.10
10000050	100	600	140	Topas*	-	36.20	24.30	16.10
10000047	100	600	188	Zeonor	-	36.20	24.30	16.10
10000414	100	600	175	PMMA*	hydrophilized	39.20	26.30	17.80
10000405	100	600	140	Topas*	hydrophilized	39.20	26.30	17.80
10000293	100	600	188	Zeonor	hydrophilized	39.20	26.30	17.80

* not suitable for PCR applications

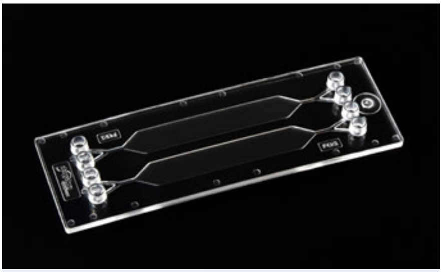


Fig. 98: Rhombic chamber chip Fluidic 172

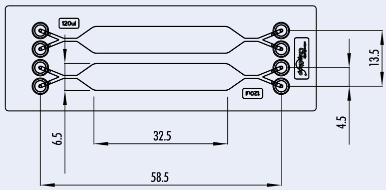


Fig. 99: Rhombic chamber chip – 120 µl chamber volume

Product Code for Fluidic 172	Chamber Volume [µl]	Chamber Depth [µm]	Lid Thickness [µm]	Material	Surface Treatment	Price [€/chip] 1+	10+	100+
10001820	120	500	175	PMMA*	-	36.20	24.30	16.10
10000111	120	500	140	Topas*	-	36.20	24.30	16.10
10000112	120	500	175	PC	-	36.20	24.30	16.10
10000113	120	500	188	Zeonor	-	36.20	24.30	16.10
10000803	120	500	125	PS*	-	36.20	24.30	16.10
10000243	120	500	175	PMMA*	hydrophilized	39.20	26.30	17.80
10000244	120	500	140	Topas*	hydrophilized	39.20	26.30	17.80
10000363	120	500	175	PC	hydrophilized	39.20	26.30	17.80
10000292	120	500	188	Zeonor	hydrophilized	39.20	26.30	17.80
10000804	120	500	125	PS*	hydrophilized	39.20	26.30	17.80

* not suitable for PCR applications

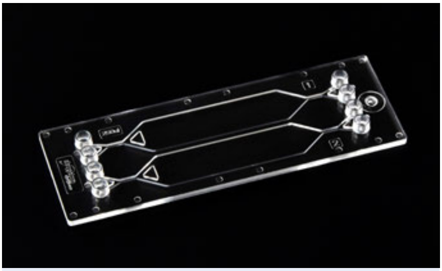


Fig. 100: Rhombic chamber chip Fluidic 194

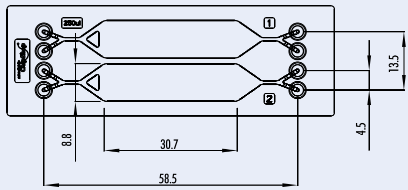


Fig. 101: Rhombic chamber chip – 250 µl chamber volume

Product Code for Fluidic 194	Chamber Volume [µl]	Chamber Depth [µm]	Lid Thickness [µm]	Material	Surface Treatment	Price [€/chip] 1+	10+	100+
10000048	250	800	175	PMMA*	-	36.20	24.30	16.10
10000051	250	800	140	Topas*	-	36.20	24.30	16.10
10000049	250	800	188	Zeonor	-	36.20	24.30	16.10
10000309	250	800	175	PMMA*	hydrophilized	39.20	26.30	17.80
10000365	250	800	140	Topas*	hydrophilized	39.20	26.30	17.80
10000340	250	800	188	Zeonor	hydrophilized	39.20	26.30	17.80

* not suitable for PCR applications

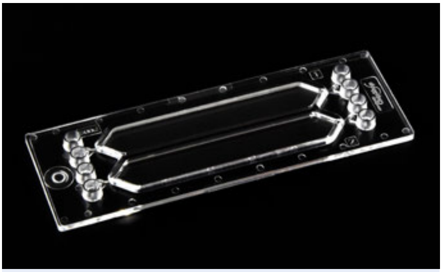


Fig. 102: Rhombic chamber chip Fluidic 844

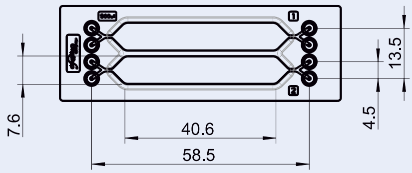


Fig. 103: Rhombic chamber chip Fluidic 844 – 500 µl chamber volume

Product Code for Fluidic 844	Chamber Volume [µl]	Chamber Depth [µm]	Lid Thickness [µm]	Material	Surface Treatment	Price [€/chip] 1+	10+	100+
10000996	500	1,500	175	PMMA*	-	36.20	24.30	16.10
10000997	500	1,500	140	Topas*	-	36.20	24.30	16.10
10000998	500	1,500	188	Zeonor	-	36.20	24.30	16.10
10000999	500	1,500	125	PS*	-	36.20	24.30	16.10
10001000	500	1,500	175	PMMA*	hydrophilized	39.20	26.30	17.80
10001001	500	1,500	140	Topas*	hydrophilized	39.20	26.30	17.80
10001002	500	1,500	188	Zeonor	hydrophilized	39.20	26.30	17.80
10001003	500	1,500	125	PS*	hydrophilized	39.20	26.30	17.80

* not suitable for PCR applications

Fig. 104: Rhombic chamber chip Fluidic 845

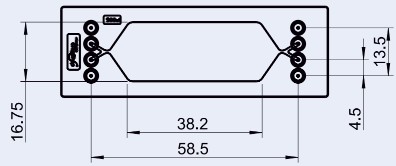


Fig. 105: Rhombic chamber chip Fluidic 845 – 500 µl chamber volume

Product Code for Fluidic 845	Chamber		Lid	Material	Surface Treatment	Price [€/chip]		
	Volume [µl]	Depth [µm]	Thickness [µm]			1+	10+	100+
10001004	500	700	175	PMMA*	-	36.20	24.30	16.10
10001005	500	700	140	Topas*	-	36.20	24.30	16.10
10001006	500	700	188	Zeonor	-	36.20	24.30	16.10
10001007	500	700	125	PS*	-	36.20	24.30	16.10
10001012	500	700	175	PMMA*	hydrophilized	39.20	26.30	17.80
10001013	500	700	140	Topas*	hydrophilized	39.20	26.30	17.80
10001014	500	700	188	Zeonor	hydrophilized	39.20	26.30	17.80
10001015	500	700	125	PS*	hydrophilized	39.20	26.30	17.80

* not suitable for PCR applications

3.7.2.2 Chamber chips – Chamber orientation: lengthwise - Reaction chamber chips

Just as the rhombic chamber chips, reaction chamber chips feature one or more chambers, however, each chamber only possesses one inlet and one outlet in most cases.

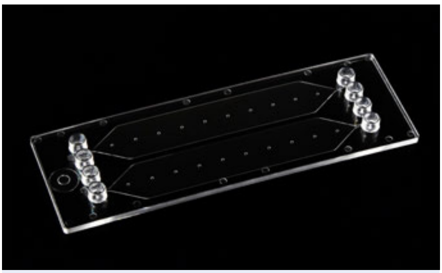


Fig. 106: Shallow chamber chip Fluidic 1273 with Mini Luer interfaces

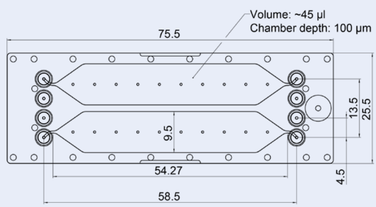


Fig. 107: Fluidic 1273 features a shallow chamber, ideal for e.g. droplet monitoring

Product Code for Fluidic 1273	Chamber		Lid	Material	Surface Treatment	Price [€/chip]		
	Volume [µl]	Depth [µm]	Thickness [µm]			1+	10+	100+
10001682	44.2	100	140	Topas*	-	36.20	24.30	16.10
10001683	44.2	100	175	PC	-	36.20	24.30	16.10
10001684	44.2	100	140	Topas*	hydrophilized	39.20	26.30	17.80
10001685	44.2	100	175	PC	hydrophilized	39.20	26.30	17.80

* not suitable for PCR applications

3.7.3 Chamber chips – Chamber orientation: crosswise

3.7.3.1 Chamber chips – Chamber orientation: crosswise - Rhombic chamber chips

Like their counterpart with lengthwise chamber orientation, these chips offer rhombic chambers with two inlets and two outlets and are therefore versatile tools for various experimental procedures, such as sample preparation. Please note, chips with crosswise rhombic chamber orientation are not suitable for use with the on-chip sample preparation instrument ChipGenie® edition P.

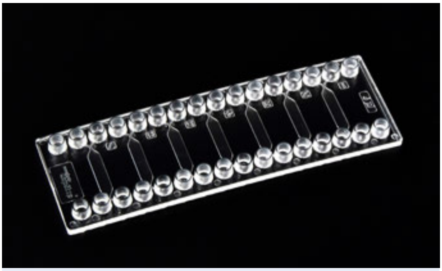


Fig. 108: Rhombic chamber chip Fluidic 132

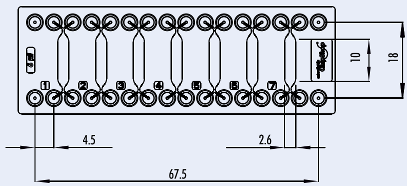


Fig. 109: Rhombic chamber chip – 6 µl chamber volume

Product Code for Fluidic 132	Chamber Volume [µl]	Chamber Depth [µm]	Lid Thickness [µm]	Material	Surface Treatment	Price [€/chip] 1+	Price [€/chip] 10+	Price [€/chip] 100+
10000114	6	200	175	PMMA*	-	36.20	24.30	16.10
10000034	6	200	140	Topas*	-	36.20	24.30	16.10
10000115	6	200	188	Zeonor	-	36.20	24.30	16.10
10000310	6	200	175	PMMA*	hydrophilized	39.20	26.30	17.80
10000035	6	200	140	Topas*	hydrophilized	39.20	26.30	17.80
10000279	6	200	188	Zeonor	hydrophilized	39.20	26.30	17.80

* not suitable for PCR applications

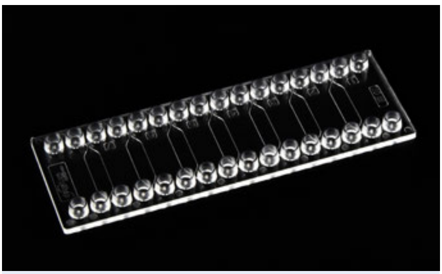


Fig. 110: Rhombic chamber chip Fluidic 439

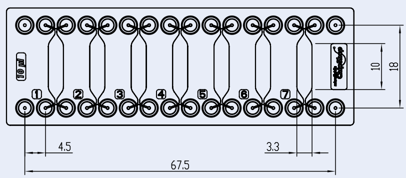


Fig. 111: Rhombic chamber chip – chamber volume 10 µl

Product Code for Fluidic 439	Chamber Volume [µl]	Chamber Depth [µm]	Lid Thickness [µm]	Material	Surface Treatment	Price [€/chip] 1+	10+	100+
10001880	10	250	175	PMMA*	-	36.20	24.30	16.10
10000399	10	250	140	Topas*	-	36.20	24.30	16.10
10000531	10	250	188	Zeonor	-	36.20	24.30	16.10
10001881	10	250	175	PMMA*	hydrophilized	39.20	26.30	17.80
10000533	10	250	140	Topas*	hydrophilized	39.20	26.30	17.80
10000534	10	250	188	Zeonor	hydrophilized	39.20	26.30	17.80

* not suitable for PCR applications

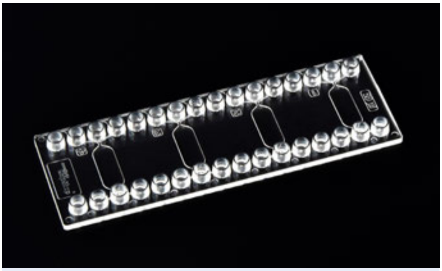


Fig. 112: Rhombic chamber chip Fluidic 131

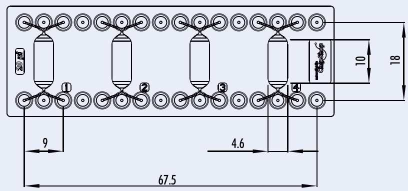


Fig. 113: Rhombic chamber chip – 20 µl chamber volume

Product Code for Fluidic 131	Chamber Volume [µl]	Chamber Depth [µm]	Lid Thickness [µm]	Material	Surface Treatment	Price [€/chip] 1+	10+	100+
10000392	20	400	175	PMMA*	-	36.20	24.30	16.10
10000298	20	400	140	Topas*	-	36.20	24.30	16.10
10000245	20	400	188	Zeonor	-	36.20	24.30	16.10
10000434	20	400	175	PMMA*	hydrophilized	39.20	26.30	17.80
10000435	20	400	140	Topas*	hydrophilized	39.20	26.30	17.80
10000436	20	400	188	Zeonor	hydrophilized	39.20	26.30	17.80

* not suitable for PCR applications

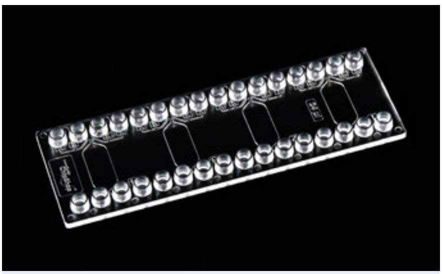


Fig. 114: Rhombic chamber chip Fluidic 133

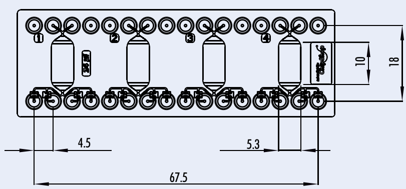


Fig. 115: Rhombic chamber chip – 24 µl chamber volume

Product Code for Fluidic 133	Chamber Volume [µl]	Chamber Depth [µm]	Lid Thickness [µm]	Material	Surface Treatment	Price [€/chip] 1+	10+	100+
10000355	24	400	175	PMMA*	-	36.20	24.30	16.10
10000260	24	400	140	Topas*	-	36.20	24.30	16.10
10000354	24	400	188	Zeonor	-	36.20	24.30	16.10
10000529	24	400	175	PMMA*	hydrophilized	39.20	26.30	17.80
10000261	24	400	140	Topas*	hydrophilized	39.20	26.30	17.80
10000204	24	400	188	Zeonor	hydrophilized	39.20	26.30	17.80

* not suitable for PCR applications

3.7.3.2 Chamber chips – Chamber orientation: crosswise - Reaction chamber chips

Reaction chamber chip belong to the simplest, however most versatile, microfluidic devices. From basic reaction chamber to cell culture tool - many experimental setups can be facilitated with this chip familiy. *microfluidic ChipShop* offer a wide variety of reaction chamber chips with volumes ranging from as little as 2.5 µl to as large as 50 µl.

Some fluidic designs, namely Fluidic 843; 750; 585; 584; 842, are particularly suited to be used for heat-cycle applications, such as PCR experiments, during which small air bubbles can form within the chambers of a microfluidic chip. For undisturbed fluorescent readouts, those microfluidic chips all feature *microfluidic ChipShop*'s unique bubble-trapping-rim-design, specifically developed to keep the detection area of each chamber air bubble-free.

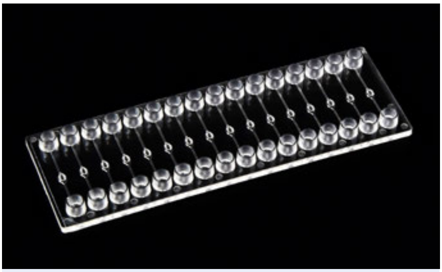


Fig. 116: Reaction chamber chip Fluidic 843 – chamber volume 2.5 µl

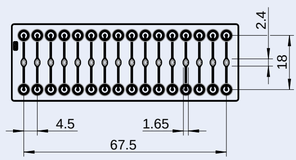


Fig. 117: Reaction chamber chip Fluidic 843 – chamber volume 2.5 µl

Product Code for Fluidic 843	Chamber Volume [µl]	Chamber Depth [µm]	Lid Thickness [µm]	Material	Surface Treatment	Price [€/chip] 1+	10+	100+
10001264	2.5	500	140	Topas*	-	36.20	24.30	16.10
10001008	2.5	500	175	Topas	-	39.80	26.70	16.90
10001009	2.5	500	175	PC	-	36.20	24.30	16.10
10001010	2.5	500	188	Zeonor	-	36.20	24.30	16.10
10001269	2.5	500	140	Topas*	hydrophilized	39.20	26.30	17.80
10001011	2.5	500	175	Topas	hydrophilized	42.80	28.70	18.60
10001016	2.5	500	175	PC	hydrophilized	39.20	26.30	17.80
10001017	2.5	500	188	Zeonor	hydrophilized	39.20	26.30	17.80

* not suitable for PCR applications

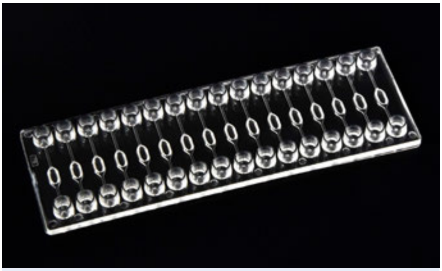


Fig. 118: Reaction chamber chip Fluidic 750 – chamber volume 5 μl

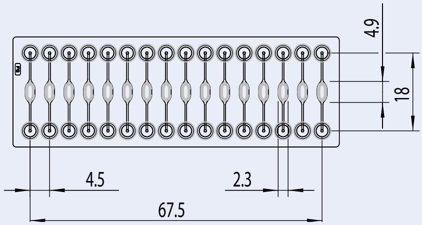


Fig. 119: Reaction chamber chip Fluidic 750 – chamber volume 5 μl

Product Code for Fluidic 750	Chamber Volume [μl]	Chamber Depth [μm]	Lid Thickness [μm]	Material	Surface Treatment	Price [€/chip] 1+	Price [€/chip] 10+	Price [€/chip] 100+
10001037	5	500	140	Topas*	-	36.20	24.30	16.10
10001292	5	500	175	Topas	-	39.80	26.70	16.90
10001038	5	500	175	PC	-	36.20	24.30	16.10
10001039	5	500	188	Zeonor	-	36.20	24.30	16.10
10001040	5	500	140	Topas*	hydrophilized	39.20	26.30	17.80
10001293	5	500	175	Topas	hydrophilized	42.80	28.70	18.60
10001041	5	500	175	PC	hydrophilized	39.20	26.30	17.80
10001042	5	500	188	Zeonor	hydrophilized	39.20	26.30	17.80

* not suitable for PCR applications

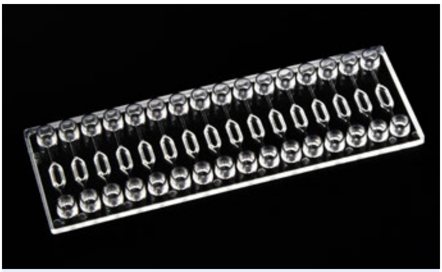


Fig. 120: Reaction chamber chip Fluidic 585 – chamber volume 10 μl

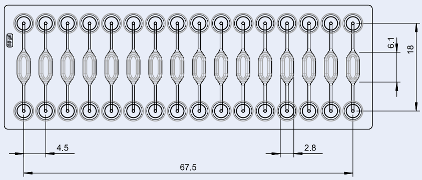


Fig. 121: Reaction chamber chip Fluidic 585 – chamber volume 10 μl

Product Code for Fluidic 585	Chamber Volume [μl]	Chamber Depth [μm]	Lid Thickness [μm]	Material	Surface Treatment	Price [€/chip] 1+	Price [€/chip] 10+	Price [€/chip] 100+
10001268	10	500	140	Topas*	-	36.20	24.30	16.10
10000524	10	500	175	Topas	-	39.80	26.70	16.90
10000525	10	500	175	PC	-	36.20	24.30	16.10
10000447	10	500	188	Zeonor	-	36.20	24.30	16.10
10001267	10	500	140	Topas*	hydrophilized	39.20	26.30	17.80
10000526	10	500	175	Topas	hydrophilized	42.80	28.70	18.60
10000527	10	500	175	PC	hydrophilized	39.20	26.30	17.80
10000528	10	500	188	Zeonor	hydrophilized	39.20	26.30	17.80

* not suitable for PCR applications

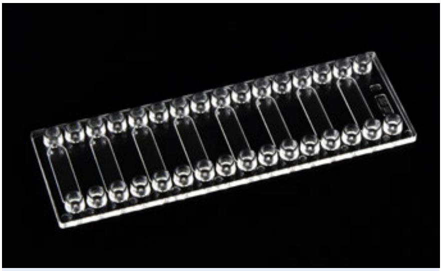


Fig. 122: Reaction chamber chip Fluidic 559 – chamber volume 20 µl

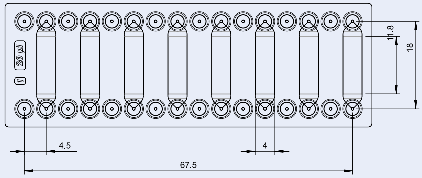


Fig. 123: Reaction chamber chip Fluidic 559 – chamber volume 20 µl

Product Code for Fluidic 559	Chamber Volume [µl]	Chamber Depth [µm]	Lid Thickness [µm]	Material	Surface Treatment	Price [€/chip] 1+	Price [€/chip] 10+	Price [€/chip] 100+
10000560	20	350	140	Topas*	-	36.20	24.30	16.10
10001137	20	350	175	PC	-	36.20	24.30	16.10
10000561	20	350	188	Zeonor	-	36.20	24.30	16.10
10000562	20	350	140	Topas*	hydrophilized	39.20	26.30	17.80
10000563	20	350	175	PC	hydrophilized	39.20	26.30	17.80
10000564	20	350	188	Zeonor	hydrophilized	39.20	26.30	17.80

* not suitable for PCR applications

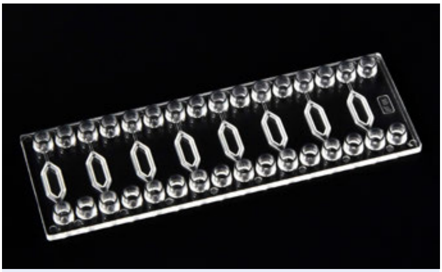


Fig. 124: Reaction chamber chip Fluidic 584 with 500 µm chamber depth

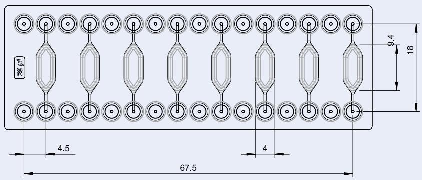


Fig. 125: Reaction chamber chip Fluidic 584 – chamber volume 20 µl

Product Code for Fluidic 584	Chamber Volume [µl]	Chamber Depth [µm]	Lid Thickness [µm]	Material	Surface Treatment	Price [€/chip] 1+	Price [€/chip] 10+	Price [€/chip] 100+
10001294	20	500	140	Topas*	-	36.20	24.30	16.10
10001296	20	500	175	Topas	-	39.80	26.70	16.90
10000555	20	500	175	PC	-	36.20	24.30	16.10
10000556	20	500	188	Zeonor	-	36.20	24.30	16.10
10000557	20	500	140	Topas*	hydrophilized	39.20	26.30	17.80
10001297	20	500	175	Topas	hydrophilized	42.80	28.70	18.60
10000558	20	500	175	PC	hydrophilized	39.20	26.30	17.80
10000559	20	500	188	Zeonor	hydrophilized	39.20	26.30	17.80

* not suitable for PCR applications

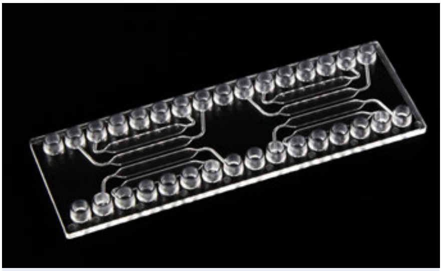


Fig. 126: Reaction chamber chip Fluidic 478 with a special chamber setup

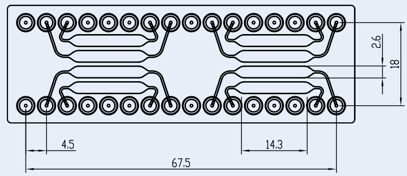


Fig. 127: Detailed schematic drawing of the reaction chamber chip Fluidic 478

Product Code for Fluidic 478	Chamber Volume [µl]	Chamber Depth [µm]	Lid Thickness [µm]	Material	Surface Treatment	Price [€/chip] 1+	10+	100+
10000547	20	500	175	PMMA*	-	36.20	24.30	16.10
10000300	20	500	140	Topas*	-	36.20	24.30	16.10
10000311	20	500	188	Zeonor	-	36.20	24.30	16.10
10000548	20	500	175	PMMA*	hydrophilized	39.20	26.30	17.80
10000549	20	500	140	Topas*	hydrophilized	39.20	26.30	17.80
10000550	20	500	188	Zeonor	hydrophilized	39.20	26.30	17.80

* not suitable for PCR applications

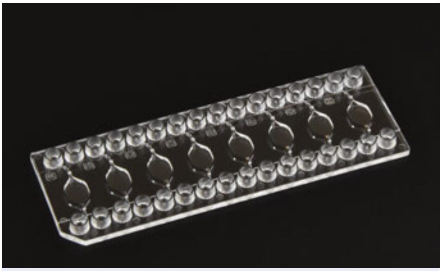


Fig. 128: Reaction chamber chip Fluidic 1068 with chambers suitable for fluorescent and luminescent readouts

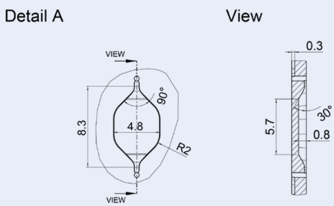


Fig. 129: Chamber detail of Fluidic 1068. The chamber is observed from the top

Product Code for Fluidic 1068	Chamber Volume [µl]	Chamber Depth [µm]	Lid Thickness [µm]	Material & Color	Surface Treatment	Price [€/chip] 1+	10+	100+
10002076	20	800	140	Topas - transparent*	-	48.50	36.50	22.40
10002082	20	800	140	Topas - black*	-	48.50	36.50	22.40
10001778	20	800	188	Zeonor - transparent	-	48.50	36.50	22.40
10001780	20	800	188	Zeonor - white	-	48.50	36.50	22.40
10001782	20	800	188	Zeonor - black	-	48.50	36.50	22.40
10002077	20	800	140	Topas - transparent*	hydrophilized	51.50	38.50	24.10
10002087	20	800	140	Topas - black*	hydrophilized	51.50	38.50	24.10
10001779	20	800	188	Zeonor - transparent	hydrophilized	51.50	38.50	24.10
10001781	20	800	188	Zeonor - white	hydrophilized	51.50	38.50	24.10
10001783	20	800	188	Zeonor - black	hydrophilized	51.50	38.50	24.10

* not suitable for PCR applications

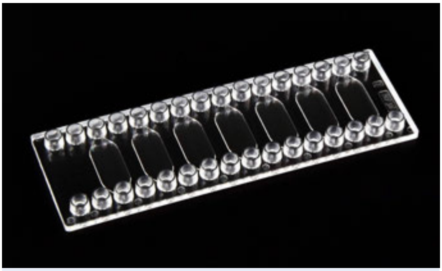


Fig. 130:Reaction chamber chip Fluidic 1003 with Mini Luer interfaces

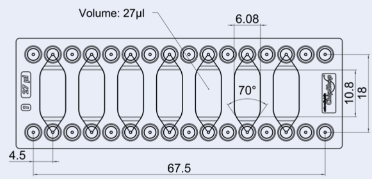


Fig. 131: Reaction chamber chip Fluidic 1003 – chamber volume 27 µl

Product Code for Fluidic 1003	Chamber Volume [µl]	Chamber Depth [µm]	Lid Thickness [µm]	Material	Surface Treatment	Price [€/chip] 1+	10+	100+
10001320	27	350	140	Topas*	-	36.20	24.30	16.10
10001322	27	350	175	PC	-	36.20	24.30	16.10
10001324	27	350	188	Zeonor	-	36.20	24.30	16.10
10001326	27	350	125	PS*	-	36.20	24.30	16.10
10001321	27	350	140	Topas*	hydrophilized	39.20	26.30	17.80
10001323	27	350	175	PC	hydrophilized	39.20	26.30	17.80
10001325	27	350	188	Zeonor	hydrophilized	39.20	26.30	17.80
10001327	27	350	125	PS*	hydrophilized	39.20	26.30	17.80

* not suitable for PCR applications

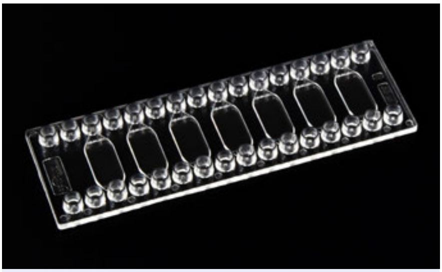


Fig. 132: Reaction chamber chip Fluidic 557 with Mini Luer interfaces

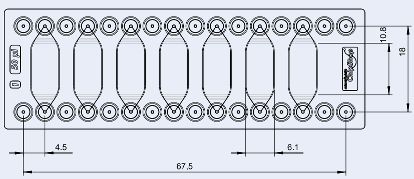


Fig. 133: Reaction chamber chip Fluidic 557 – chamber volume 50 µl

Product Code for Fluidic 557	Chamber Volume [µl]	Chamber Depth [µm]	Lid Thickness [µm]	Material	Surface Treatment	Price [€/chip] 1+	10+	100+
10000577	50	700	140	Topas*	-	36.20	24.30	16.10
10000578	50	700	175	PC	-	36.20	24.30	16.10
10000579	50	700	188	Zeonor	-	36.20	24.30	16.10
10000825	50	700	125	PS*	-	36.20	24.30	16.10
10000580	50	700	140	Topas*	hydrophilized	39.20	26.30	17.80
10000581	50	700	175	PC	hydrophilized	39.20	26.30	17.80
10000582	50	700	188	Zeonor	hydrophilized	39.20	26.30	17.80
10000826	50	700	125	PS*	hydrophilized	39.20	26.30	17.80

* not suitable for PCR applications

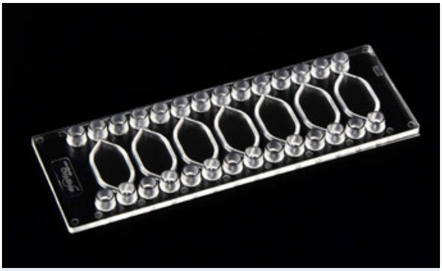


Fig. 134: Reaction chamber chip Fluidic 842 – chamber volume 50 μl

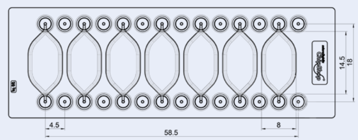


Fig. 135: Reaction chamber chip Fluidic 842 – chamber volume 50 μl

Product Code for Fluidic 842	Chamber Volume [μl]	Chamber Depth [μm]	Lid Thickness [μm]	Material	Surface Treatment	Price [€/chip] 1+	Price [€/chip] 10+	Price [€/chip] 100+
10001031	50	500	140	Topas*	-	36.20	24.30	16.10
10001298	50	500	175	Topas	-	39.80	26.70	16.90
10001032	50	500	175	PC	-	36.20	24.30	16.10
10001033	50	500	188	Zeonor	-	36.20	24.30	16.10
10001034	50	500	140	Topas*	hydrophilized	39.20	26.30	17.80
10001299	50	500	175	Topas	hydrophilized	42.80	28.70	18.60
10001035	50	500	175	PC	hydrophilized	39.20	26.30	17.80
10001036	50	500	188	Zeonor	hydrophilized	39.20	26.30	17.80

* not suitable for PCR applications

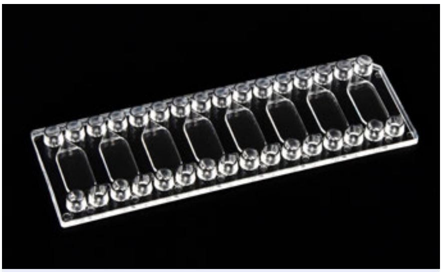


Fig. 136: Reaction chamber chip Fluidic 1066 – chamber volume 50 μl

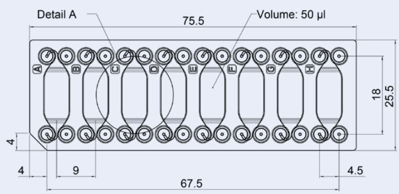


Fig. 137: Detailed schematic drawing of reaction chamber chip Fluidic 1066 – chamber volume 50 μl

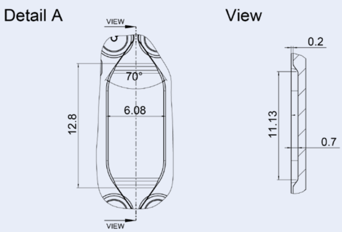


Fig. 138: Reaction chamber chip Fluidic 1066 with eight reaction chambers of 700 μm depth

Product Code for Fluidic 1066	Chamber Volume [µl]	Chamber Depth [µm]	Lid Thickness [µm]	Material	Surface Treatment	Price [€/chip] 1+	10+	100+
10001485	50	700	140	Topas*	-	36.20	24.30	16.10
10001488	50	700	175	Topas	-	39.80	26.70	16.90
10001483	50	700	175	PC	-	36.20	24.30	16.10
10001484	50	700	188	Zeonor	-	36.20	24.30	16.10
10001491	50	700	140	Topas*	hydrophilized	39.20	26.30	17.80
10001492	50	700	175	Topas	hydrophilized	42.80	28.70	18.60
10001489	50	700	175	PC	hydrophilized	39.20	26.30	17.80
10001490	50	700	188	Zeonor	hydrophilized	39.20	26.30	17.80

* not suitable for PCR applications

3.7.4 Reaction chamber chips – Various chamber volumes

3.7.4.1 Chamber chips – Various chamber volumes - Rhombic chamber chips

The rhombic chamber chip with chambers featuring various volumes on one chip is the perfect tool to help choosing the right chamber geometry in the design process of integrated microfluidic devices.

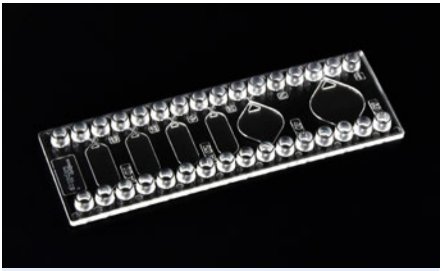


Fig. 139: Rhombic chamber chip Fluidic 134

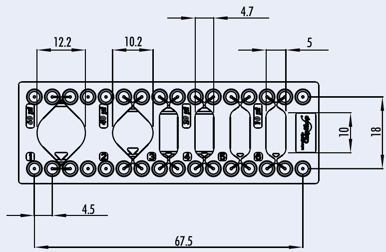


Fig. 140: Rhombic chamber chip – chamber volumes: 60 µl, 40 µl, 2 x 20 µl, 2 x 10 µl

Product Code for Fluidic 134	Chamber Volume [µl]	Chamber Depth [µm]	Lid Thickness [µm]	Material	Surface Treatment	Price [€/chip] 1+	10+	100+
10000269	10/10 20/20 40/60	200/200 400/400 540/540	175	PMMA*	-	36.20	24.30	16.10
10000299	10/10 20/20 40/60	200/200 400/400 540/540	140	Topas*	-	36.20	24.30	16.10
10000121	10/10 20/20 40/60	200/200 400/400 540/540	188	Zeonor	-	36.20	24.30	16.10
10000386	10/10 20/20 40/60	200/200 400/400 540/540	175	PMMA*	hydrophilized	39.20	26.30	17.80
10000432	10/10 20/20 40/60	200/200 400/400 540/540	140	Topas*	hydrophilized	39.20	26.30	17.80
10000122	10/10 20/20 40/60	200/200 400/400 540/540	188	Zeonor	hydrophilized	39.20	26.30	17.80

* not suitable for PCR applications

3.7.4.2 Chamber chips – Various chamber volumes - Reaction chamber chips

The reaction chamber chips with an arrangement of chambers having the same dimensions besides the cavity depth and different volumes allow for the direct comparison of the chamber depth influence on the assay and the measurement. These chips assist in the choice of the right chamber dimensions in the design process of integrated microfluidic devices. For a particularly convenient handling, these chips are also available with pipetting interfaces.

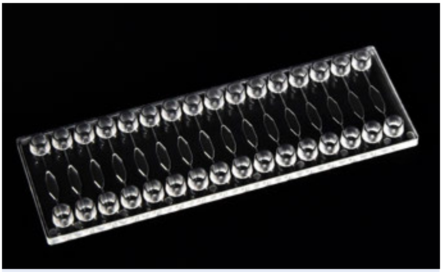


Fig. 141: Reaction chamber chip Fluidic 621 with Mini Luer interfaces

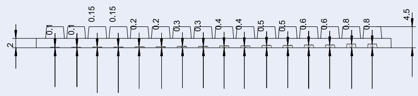


Fig. 142: Schematic drawing of reaction chamber chip – Fluidic 621

Product Code for Fluidic 621	Chamber Volume [µl]	Chamber Depth [µm]	Lid Thickness [µm]	Material	Surface Treatment	Price [€/chip] 1+	10+	100+
10000589	1.2 – 8.8	100 - 800	175	PMMA*	-	36.20	24.30	16.10
10000590	1.2 – 8.8	100 - 800	140	Topas*	-	36.20	24.30	16.10
10000591	1.2 – 8.8	100 - 800	125	PS*	-	36.20	24.30	16.10
10000592	1.2 – 8.8	100 - 800	175	PMMA*	hydrophilized	39.20	26.30	17.80
10000594	1.2 – 8.8	100 - 800	140	Topas*	hydrophilized	39.20	26.30	17.80
10000593	1.2 – 8.8	100 - 800	125	PS*	hydrophilized	39.20	26.30	17.80

* not suitable for PCR applications

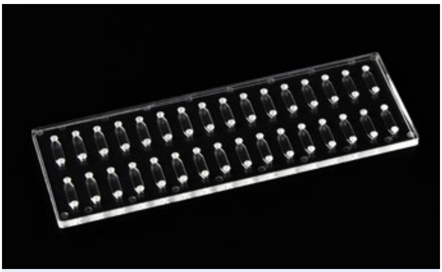


Fig. 143: Reaction chamber chip Fluidic 622 with pipetting interfaces

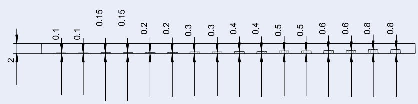


Fig. 144: Schematic drawing of reaction chamber chip – Fluidic 622

Product Code for Fluidic 622	Chamber Volume [µl]	Chamber Depth [µm]	Lid Thickness [µm]	Material	Surface Treatment	Price [€/chip] 1+	10+	100+
10001888	1.2 – 10.2	100 - 800	175	PMMA*	-	36.20	24.30	16.10
10000596	1.2 – 10.2	100 - 800	140	Topas*	-	36.20	24.30	16.10
10000597	1.2 – 10.2	100 - 800	125	PS*	-	36.20	24.30	16.10
10001889	1.2 – 10.2	100 - 800	175	PMMA*	hydrophilized	39.20	26.30	17.80
10000599	1.2 – 10.2	100 - 800	140	Topas*	hydrophilized	39.20	26.30	17.80
10000600	1.2 – 10.2	100 - 800	125	PS*	hydrophilized	39.20	26.30	17.80

* not suitable for PCR applications

Fig. 145: Reaction chamber chip Fluidic 1099 with Mini Luer interfaces

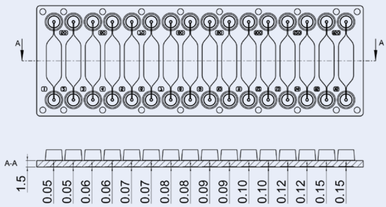


Fig. 146: Fluidic 1099 features reaction chambers with different chamber heights from 50 μm to 150 μm

Product Code for Fluidic 1099	Chamber Depth [µm]	Lid Thickness [µm]	Material	Surface Treatment	Price [€/chip]		
					1+	10+	100+
10001503	50 - 150	175	Topas	-	39.80	26.70	16.90
10001504	50 - 150	125	PS*	-	36.20	24.30	16.10
10001755	50 - 150	175	Topas	hydrophilized	42.80	28.70	18.60
10001756	50 - 150	125	PS*	hydrophilized	39.20	26.30	17.80

* not suitable for PCR applications

Fig. 147: Reaction chamber chip Fluidic 1100 with Mini Luer interfaces

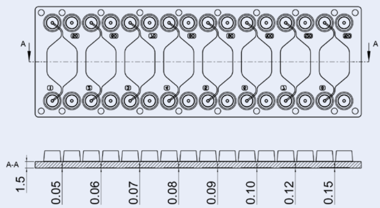


Fig. 148: Fluidic 1100 features reaction chambers with different chamber heights from 50 μm to 150 μm

Product Code for Fluidic 1100	Chamber Depth [µm]	Lid Thickness [µm]	Material	Surface Treatment	Price [€/chip]		
					1+	10+	100+
10001505	50 - 150	175	Topas	-	39.80	26.70	16.90
10001506	50 - 150	125	PS*	-	36.20	24.30	16.10
10001757	50 - 150	175	Topas	hydrophilized	42.80	28.70	18.60
10001758	50 - 150	125	PS*	hydrophilized	39.20	26.30	17.80

* not suitable for PCR applications

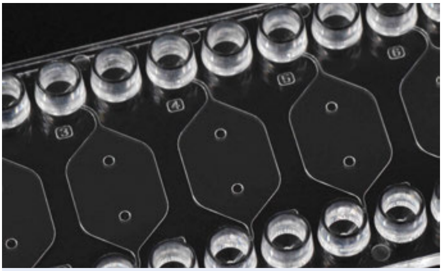


Fig. 149: Reaction chamber chip Fluidic 1101 with Mini Luer interfaces

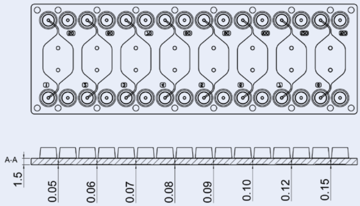


Fig. 150: Fluidic 1101 is very similar in design to Fluidic 1100 but features additional pillars within the reaction chambers

Product Code for Fluidic 1101	Chamber Depth [µm]	Lid Thickness [µm]	Material	Surface Treatment	Price [€/chip]		
					1+	10+	100+
10001507	50 - 150	175	Topas	-	39.80	26.70	16.90
10001508	50 - 150	125	PS*	-	36.20	24.30	16.10
10001759	50 - 150	175	Topas	hydrophilized	42.80	28.70	18.60
10001760	50 - 150	125	PS*	hydrophilized	39.20	26.30	17.80

* not suitable for PCR applications

3.7.4.3 Chamber chips – Various chamber volumes - Interconnected chambers

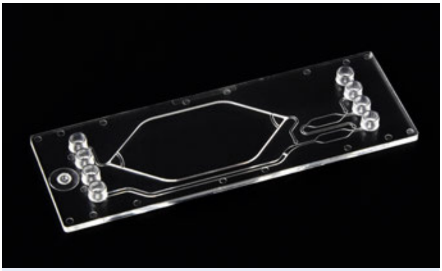


Fig. 151: Reaction chamber chip Fluidic 753 – chamber volume 400 µl

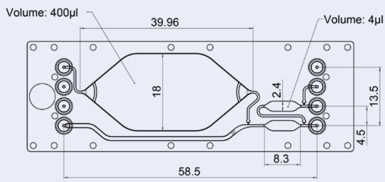


Fig. 152: Reaction chamber chip Fluidic 753 – chamber volume 400 µl

Product Code for Fluidic 753	Chamber Volume 1 [µl]	Chamber Volume 2 & 3 [µl]	Lid Thickness [µm]	Material	Surface Treatment	Price [€/chip]		
						1+	10+	100+
10001265	400	4.1	140	Topas*	-	36.20	24.30	16.10
10001044	400	4.1	175	PC	-	36.20	24.30	16.10
10001045	400	4.1	188	Zeonor	-	36.20	24.30	16.10
10001266	400	4.1	140	Topas*	hydrophilized	39.20	26.30	17.80
10001047	400	4.1	175	PC	hydrophilized	39.20	26.30	17.80
10001048	400	4.1	188	Zeonor	hydrophilized	39.20	26.30	17.80

* not suitable for PCR applications

3.8 Waste chamber chips

This chip features two individual channels, each of them connected to a large reservoir for convenient fluid waste management. Four Mini Luer interfaces for each of these channels allow not only to apply the sample, but furthermore to flow different reagent solutions in the chambers using connected pumps. The large waste reservoirs, facilitating a liquid uptake of roughly 500 µl each, enable to run assays without a need for additional waste management. A water-tight but air permeable membrane ensures that no contamination will take place through the waste reservoirs.

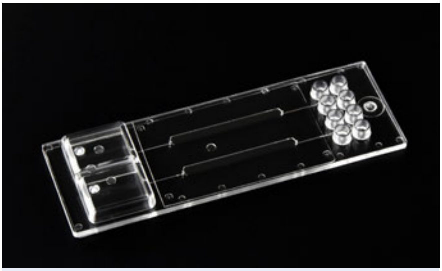


Fig. 153: Straight channel chip with waste chamber Fluidic 272

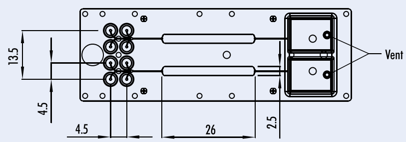


Fig. 154: Details straight channel chip with waste chamber Fluidic 272

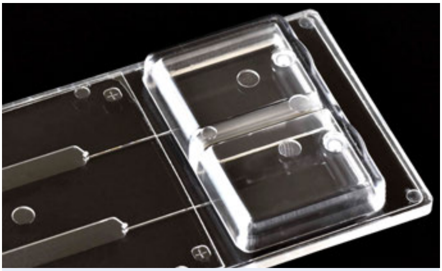


Fig. 155: Detail of the waste reservoir on the straight channel chip Fluidic 272

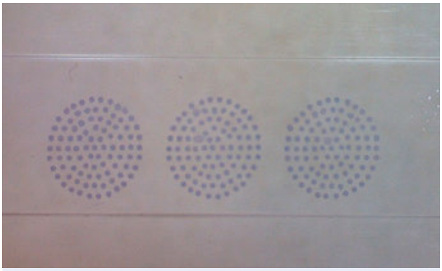


Fig. 156: Spotted probes (diameter 80 µm) in straight channel chip Fluidic 272

Product Code for Fluidic 272	Channel Width [µm]	Channel Depth [µm]	Channel Length [mm]	Lid Thickness [µm]	Material	Surface treatment	Price [€/chip] 1+	Price [€/chip] 10+	Price [€/chip] 100+
10001867	2,500	200	26.0	175	PMMA	-	44.50	31.20	23.50
10000297	2,500	200	26.0	140	Topas	-	44.50	31.20	23.50
10000268	2,500	200	26.0	188	Zeonor	-	44.50	31.20	23.50
10000644	2,500	200	26.0	188	Zeonor black	-	44.50	31.20	23.50
10000645	2,500	200	26.0	188	Zeonor white	-	44.50	31.20	23.50
10001869	2,500	200	26.0	175	PMMA	hydrophilized	55.50	36.20	25.60
10000342	2,500	200	26.0	140	Topas	hydrophilized	55.50	36.20	25.60
10000343	2,500	200	26.0	188	Zeonor	hydrophilized	55.50	36.20	25.60

3.9 Cuvette chips

This chapter summarizes a variety of microfluidic chips for optical measurements. Several of these chips feature different chamber depths within the measurement window, allowing to enlarge the dynamic range of the analytical process.

Chips for self-filling are included as well as with larger reservoirs enabling easy sample introduction combined with defined sample volume.

3.9.1 Straight channel cuvette chip

Chip with eight parallel, identical measurement cavities with three depths within each individual channel.

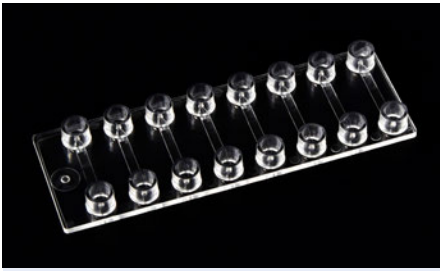


Fig. 157: Cuvette chip – Fluidic 527

Fig. 158: Cuvette chip Fluidic 527 featuring 3 different channel heights within one channel

Product Code for Fluidic 527	Description	Channel Volume [µl]	Channel Depth [µm]			Lid Thickness [µm]	Surface Treatment	Material	Price [€/chip]		
			Sec. 1	Sec. 2	Sec. 3				1+	10+	100+
10000437	Cuvette chip	6.5	50	100	500	140	-	Topas	36.20	24.30	16.10
10000438	Cuvette chip	6.5	50	100	500	140	hydrophilized	Topas	39.20	26.30	17.80

3.9.2 Cuvette tank chip

Cuvette tank chips possess a larger sample uptake interface and measurement cavities with two chamber depths. Fluidic 576 furthermore features an incubation meander before the measurement chambers.

To avoid liquid flow after filling the measurement chamber until equilibrium between inlet and outlet filling height is ensured, the chips can be equipped with a venting membrane allowing to dissipate air, but remaining liquid tight.

Fig. 159: Cuvette tank chip – Fluidic 553

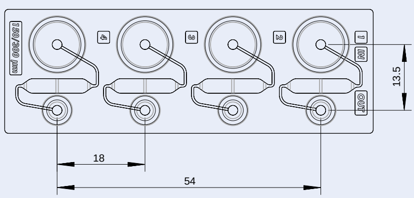


Fig. 160: Cuvette tank chip – Fluidic 553

Product Code for Fluidic 553	Description	Chamber-volume [µl]	Chamber depth [µm] Sec. 1	Sec. 2	Lid Thickness [µm]	Surface treat-ment	Venting Memb-rane	Mate-rial	Price [€/chip] 1+	10+	100+
10000816	Cuvette tank chip	6.75	150	300	140	-	-	Topas	36.20	24.30	16.10
10000817	Cuvette tank chip	6.75	150	300	140	-	Yes	Topas	46.20	31.20	20.10
10000818	Cuvette tank chip	6.75	150	300	140	Hydrophi-lized	-	Topas	39.20	26.30	17.80
10000819	Cuvette tank chip	6.75	150	300	140	Hydrophi-lized	Yes	Topas	49.20	33.20	21.90

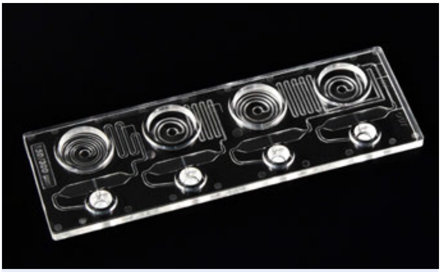


Fig. 161: Cuvette tank chip with incubation meander – Fluidic 576

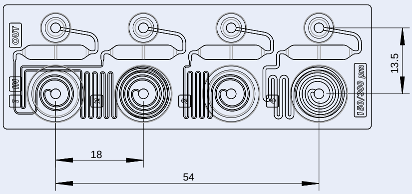


Fig. 162: Cuvette tank chip with incubation meander – Fluidic 576

Product Code for Fluidic 576	Description	Chamber-volume [µl]	Chamber depth [µm] Sec. 1	Sec. 2	Lid Thickness [µm]	Surface treat-ment	Venting Memb-rane	Mate-rial	Price [€/chip] 1+	10+	100+
10000820	Cuvette tank chip with incubation meander	6.75	150	300	140	-	-	Topas	36.20	24.30	16.10
10000821	Cuvette tank chip with incubation meander	6.75	150	300	140	-	Yes	Topas	46.20	31.20	20.10
10000822	Cuvette tank chip with incubation meander	6.75	150	300	140	hydrophi-lized	-	Topas	39.20	26.30	17.80
10000823	Cuvette tank chip with incubation meander	6.75	150	300	140	hydrophi-lized	Yes	Topas	49.20	33.20	21.90

3.10 Splitter chips

In many experimental setups splitting of contents from one microfluidic input channel is required. Splitter chips are specifically designed to evenly divide one microfluidic stream for downstream applications.

3.10.1. Splitter chips - Dead-end air reservoir

This family of chips allows to perform e.g. parallel batch PCR reactions from a single input. The input is thereby split into 8 or 10 separate reaction chambers. The reaction chamber is followed by a chamber with an enclosed air volume, which buffers the volume expansion/contraction during thermocycling. As this air volume is enclosed, no reagent loss due to evaporation occurs.
The loading pressure is designed for 250mBar.

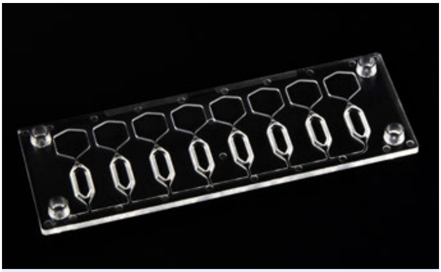


Fig. 163: Dead-end reservoir splitter chip Fluidic 675 with 8 chambers of 20 µl volume

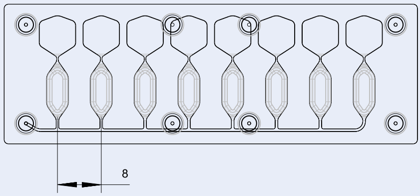


Fig. 164: Schematic drawing of Fluidic 675 with Mini Luer interface

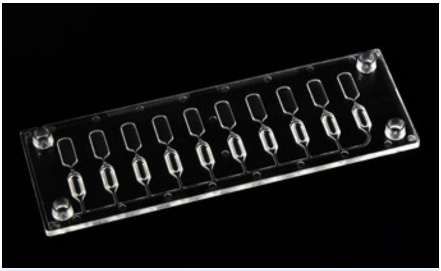


Fig. 165: Dead-end reservoir splitter chip Fluidic 683 with 10 reaction chambers of 10 µl volume

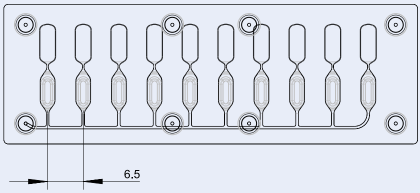


Fig. 166: Schematic drawing of Fluidic 683 with Mini Luer interface

Product Code	Fluidic	Chamber Volume [µl]	Chamber Depth [µm]	Lid Thickness [µm]	Material	Surface Treatment	Price [€/chip] 1+	Price [€/chip] 10+	Price [€/chip] 100+
10000783	675	20	500	175	Topas	-	36.20	24.30	16.10
10000784	675	20	500	175	Topas	hydrophilized	39.20	26.30	17.80
10000786	683	10	500	175	Topas	-	36.20	24.30	16.10
10000785	683	10	500	175	Topas	hydrophilized	39.20	26.30	17.80

3.10.2 Splitter chips - Flow through splitter chips

This subfamily of splitter chips is particularly suited for applications in which one microfluidic stream needs to be divided into several, for downstream applications. The chapter comprises chips which serve the task of dividing a stream into two, three or four (Fluidic 1537) or four or eight (Fluidic 532) streams, sampled via respective with Mini Luer interfaces.
Furthermore, the chapter includes chips (Fluidic 516 and 1060) that serve as splitters but come with additional downstream chambers for on-chip analysis of the replicate samples or detection tasks.

Fluidic 532 and Fluidic 516 feature performance enhancing capillary stops. Capillary stops feature higher flow resistance than the channel, hence acting as temporarily stop and only allow liquid to distribute further, once all distribution channels are filled equally. Thereby the distribution of the fluid is timely synchronized.

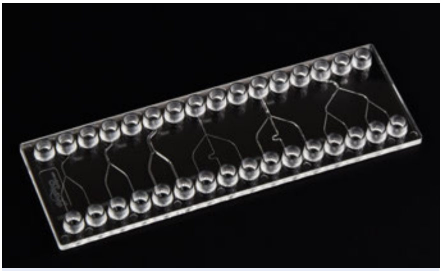


Fig. 167: Splitter chip Fluidic 1537 with Mini Luer interfaces

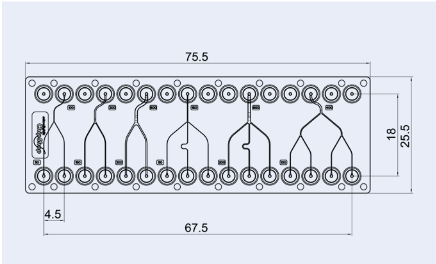


Fig. 168: Schematic drawing of splitter chip Fluidic 1537

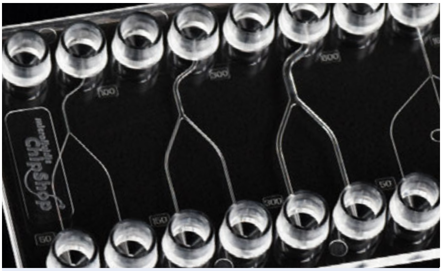


Fig. 169: Detail of the splitter units dividing one stream into two streams with varying channel sizes

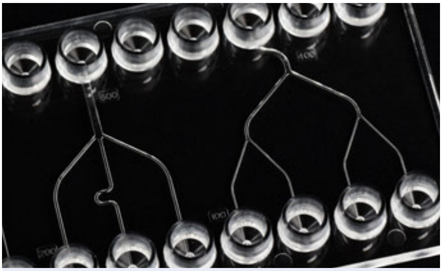


Fig. 170: Detail of the splitter units dividing one stream into three or four streams with varying channel sizes

Product Code for Fluidic 1537	Description	Lid Thickness [µm]	Material	Price [€/chip] 1+	10+	100+
10001987	Splitter chip	140	Topas	36.20	24.30	16.10
10001988	Splitter chip	175	PC	36.20	24.30	16.10
10001989	Splitter chip	188	Zeonor	36.20	24.30	16.10

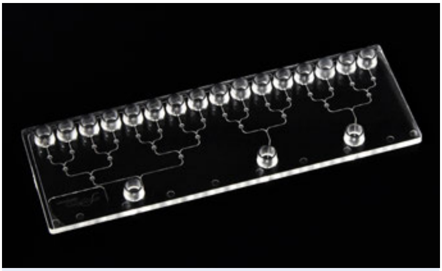


Fig. 171: Splitter chip Fluidic 532 with Mini Luer interfaces

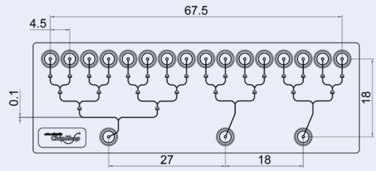


Fig. 172: Schematic drawing of splitter chip Fluidic 532

Product Code for Fluidic 532	Description	Lid Thickness [µm]	Material	Price [€/chip]		
				1+	10+	100+
10001328	Splitter chip	140	Topas	36.20	24.30	16.10

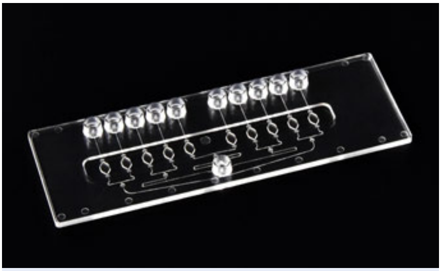


Fig. 173: Split chamber chip Fluidic 516 with Mini Luer interfaces and 2 µl chambers for on-chip analysis

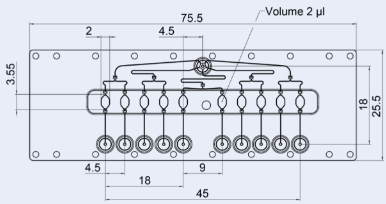


Fig. 174: Detailed schematic drawing of split chamber chip Fluidic 516

Product Code for Fluidic 516	Description	Lid Thickness [µm]	Material	Price [€/chip]		
				1+	10+	100+
10001445	Split chamber chip	140	Topas	36.20	24.30	16.10

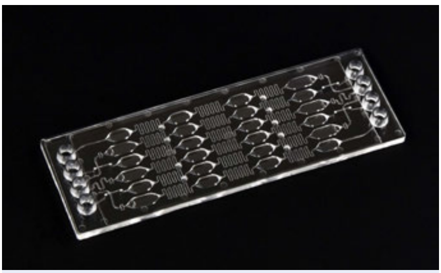


Fig. 175: Split chamber chip Fluidic 1060 with Mini Luer interfaces and µl chambers for on-chip analysis

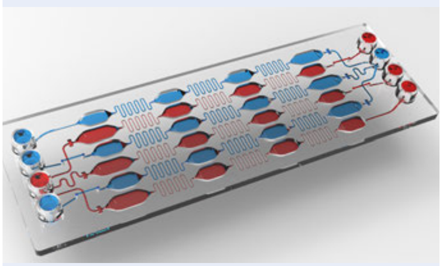


Fig. 176: Different functional units (red and blue) with in- and outlets on opposite sides of the split chamber chip Fl. 1060

Product Code for Fluidic 1060	Description	Lid Thickness [µm]	Material	Price [€/chip]		
				1+	10+	100+
10002047	Split chamber chip	188	Zeonor	42.20	34.30	26.10

3.11 Micro mixer

Microfluidic micro mixers apply different mixing principles. This chapter includes mixers applying passive and active mixing principles. Passive mixing elements with elongated channels to enforce diffusion mixing or the so-called "herringbone" mixing structures are available. Active mixers with integrated stir bars give the option to generate mixtures with a wider range of mixing ratios, e.g. coping with 1:10 mixing ratios what is not feasible with the passively working devices.

3.11.1 Passive mixers

3.11.1.1 Passive mixer – Diffusion mixer

Passive mixers mix liquids by diffusion. As flows in microchannels are normally laminar, the task of these mixers lies in the improvement of the diffusion condition, e.g. by allowing a long co-flow of the liquids or by adding structures to increase lateral velocity. As there are multiple mixing structures on each chip, these can be daisy-chained to improve the mixing result.

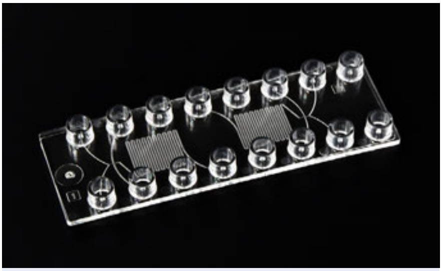


Fig. 177: Diffusion mixer chip Fluidic 186 with Luer interfaces

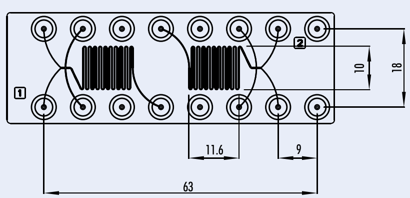


Fig. 178: Detail of diffusion mixer Fluidic 186

Fig. 179: Detail of diffusion mixer chip Fluidic 186 with Luer to fluid connectors (green), male Luer plugs (black) and tubing

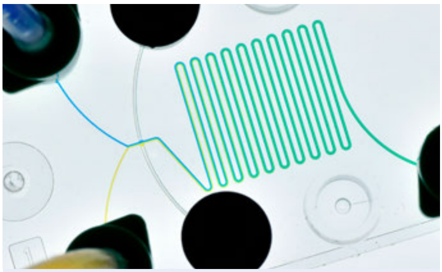


Fig. 180: Mixing of colored water with Fluidic 186

Product Code for Fluidic 186	Lid Thickness [µm]	Channel Depth [µm]	Channel Width [µm]	Material	Price [€/chip]		
					1+	10+	100+
10000018	175	100	inlets 100 / 200 mixer 200 outlet 200	PC	42.20	31.50	19.30
10000075	188	100	intets 100 / 200 mixer 200 outlet 200	Zeonor	42.20	31.50	19.30

3.11.1.2 Passive mixer – Herringbone mixer

The herringbone mixer chips possess ribbed micro structures in the central channel, which allow for the efficient mixing of different reagents.
Herringbone mixer **Fluidic 187**, posessing Luer interfaces, features three fuctional mixing units per chip, with a lenght of 9.4 mm each. In contrast, herringbone mixer **Fluidic 1460**, possessing mini Luer interfaces, features a prolonged mixing section. This enables even more efficient mixing of liquids.

Herringbone Mixer - Channel variation chip Fluidic 1460 has four functional mixing units, two of which are identical. Each unit has two inlets and one outlet. All inlets and outlets feature a Mini Luer interface. Key features of the different mixing units on Fluidic 1460 are:

- Channel structure A:
  - Channel depth: 200 µm
  - Channel width: 600 µm
- Channel structure B:
  - Channel depth: 100 µm
  - Channel width: 400 µm

Due to the uniformly arranged mixing structures these chips are the ideal tool for the generation of homogeneous Lipid nanoparticles (LNPs). The synthesis of LNPs can be tailored to a defined size, which is dependant on the size of the mixing structure as well as on the flow rate ratio of the organic and the aqueous phase.

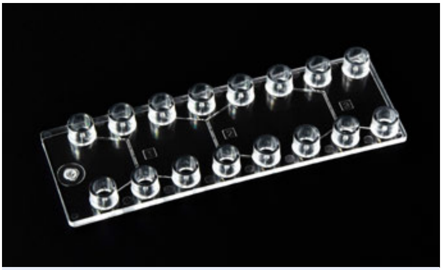


Fig. 181: Herringbone mixer I Fluidic 187 with Luer interfaces

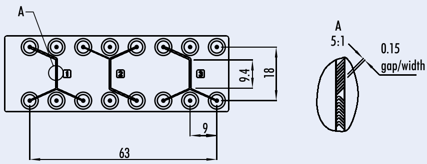


Fig. 182: Detail of herringbone mixer I Fluidic 187

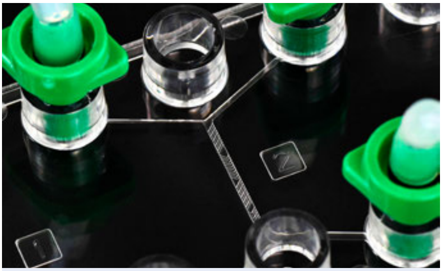


Fig. 183: One unit of the Herringbone mixer chip Fluidic 187, equipped with Luer to fluid connectors and tubing

Product Code for Fluidic 187	Lid Thickness [µm]	Channel Depth [µm]	Channel Width [µm]	Material	Price [€/chip]		
					1+	10+	100+
10000019	175	200	600	PC	42.20	31.50	19.30
10000076	188	200	600	Zeonor	42.20	31.50	19.30
10001996	140	200	600	Topas	42,20	31.50	19.30

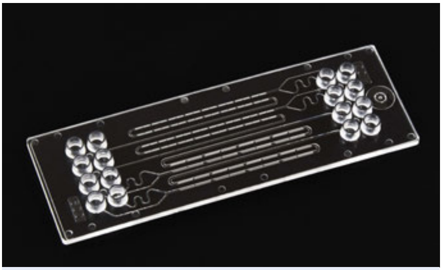


Fig. 184: Herringbone mixer II Fluidic 1460

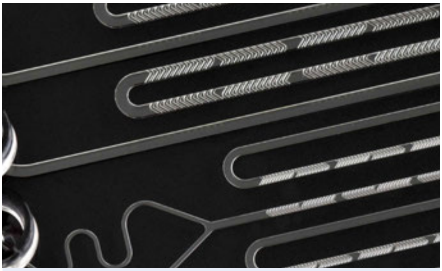


Fig. 185: Comparison of different Herringbone mixer structures A and B on chip Fluidic 1460

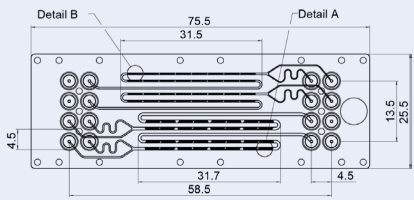


Fig. 186: Schematic drawing of herringbone mixer II Fluidic 1460

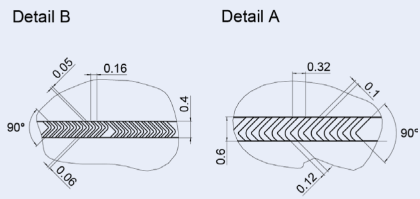


Fig. 187: Detail of herringbone mixer II Fluidic 1460

Product Code for Fluidic 1460	Lid Thickness [µm]	Channel Dimensions [µm]	Material	Price [€/chip]		
				1+	10+	100+
10001931	175	A: depth 200 µm, width 600 µm B: depth 100 µm, width 400 µm	Zeonor	42.20	34.40	26.10
10001930	188	A: depth 200 µm, width 600 µm B: depth 100 µm, width 400 µm	PC	42.20	34.40	26.10

3.11.1.3 Passive mixer – Phase guide mixer

This mixer is based on the principle as described in: S. Hakenberg et al., A phaseguided passive batch microfluidic mixing chamber for isothermal amplification, Lab Chip, 12, 4576-4580, 2012.

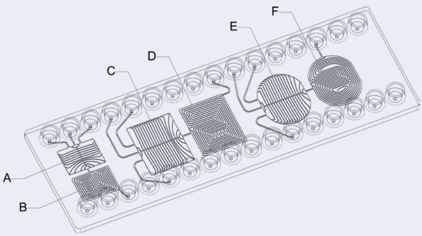


Fig. 188: Schematic drawing of phase guide mixer chip Fluidic 533 with Mini Luer interfaces

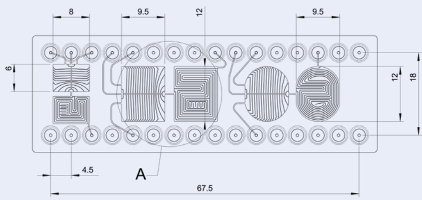


Fig. 189: Phase guide mixer chip Fluidic 533

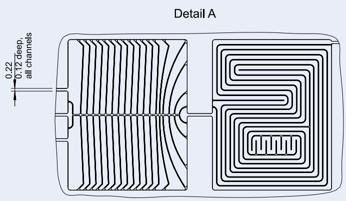


Fig. 190: Detail drawing of phase guide mixer chip Fluidic 533

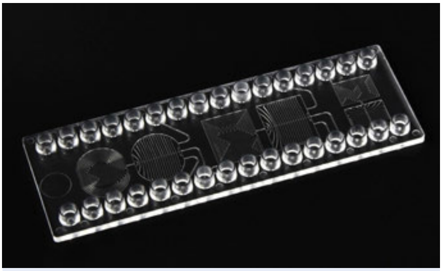


Fig. 191: Phase guide mixer chip Fluidic 533

Product Code for Fluidic 533	Description	Chamber volumes	Lid Thickness [µm]	Surface Treatment	Material	Price [€/chip] 1+	10+	100+
10000552	Phase guide mixer chip	A & B: 5.6 µl C & D: 13.2 µl E & F: 11.1 µl	140	-	Topas	42.20	31.50	19.30
10000553	Phase guide mixer chip	A & B: 5.6 µl C & D: 13.2 µl E & F: 11.1 µl	140	hydrophilized	Topas	46.20	34.70	21.40

3.11.1.4 Passive mixer – Micro vortex mixer

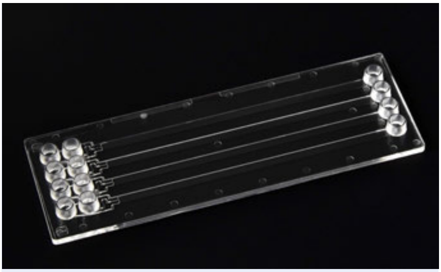


Fig. 192: Micro vortex mixer Fluidic 640 with Mini Luer interfaces

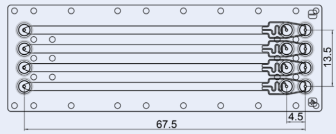


Fig. 193: Micro vortex mixer Fluidic 640

Product Code for Fluidic 640	Description	Lid Thickness [µm]	Material	Surface Treatment	Price [€/chip] 1+	10+	100+
10000771	Micro vortex mixer	175	PMMA	-	42.20	31.50	19.30
10000772	Micro vortex mixer	140	Topas	-	42.20	31.50	19.30
10000773	Micro vortex mixer	175	PC	-	42.20	31.50	19.30
10000774	Micro vortex mixer	175	PMMA	hydrophilized	46.20	34.70	21.40
10000775	Micro vortex mixer	140	Topas	hydrophilized	46.20	34.70	21.40
10000776	Micro vortex mixer	175	PC	hydrophilized	46.20	34.70	21.40

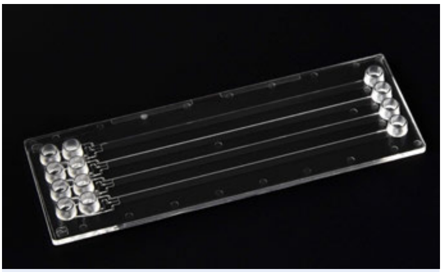


Fig. 194: Micro vortex mixer Fluidic 641 with Mini Luer interfaces

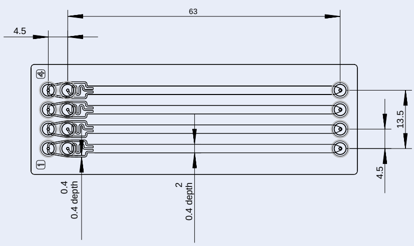


Fig. 195: Micro vortex mixer Fluidic 641

Product Code for Fluidic 641	Description	Lid Thickness [µm]	Material	Surface Treatment	Price [€/chip] 1+	10+	100+
10001901	Micro vortex mixer	175	PMMA	-	42.20	31.50	19.30
10000778	Micro vortex mixer	140	Topas	-	42.20	31.50	19.30
10000779	Micro vortex mixer	175	PC	-	42.20	31.50	19.30
10001904	Micro vortex mixer	175	PMMA	hydrophilized	46.20	34.70	21.40
10000781	Micro vortex mixer	140	Topas	hydrophilized	46.20	34.70	21.40
10000782	Micro vortex mixer	175	PC	hydrophilized	46.20	34.70	21.40

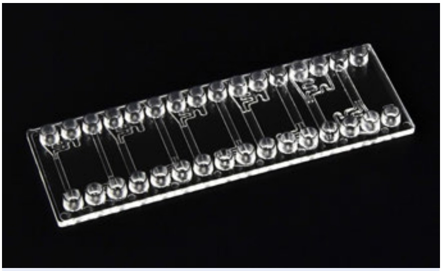


Fig. 196: Micro vortex mixer Fluidic 642 with Mini Luer interfaces

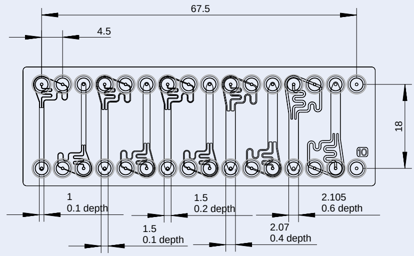


Fig. 197: Micro vortex mixer Fluidic 642

Product Code for Fluidic 642	Description	Lid Thickness [µm]	Material	Surface Treatment	Price [€/chip] 1+	10+	100+
10001204	Micro vortex mixer	175	PMMA	-	42.20	31.50	19.30
10000824	Micro vortex mixer	140	Topas	-	42.20	31.50	19.30
10001206	Micro vortex mixer	175	PC	-	42.20	31.50	19.30
10001205	Micro vortex mixer	175	PMMA	hydrophilized	46.20	34.70	21.40
10000961	Micro vortex mixer	140	Topas	hydrophilized	46.20	34.70	21.40
10001207	Micro vortex mixer	175	PC	hydrophilized	46.20	34.70	21.40

3.11.1.5 Passive mixer – Pearl chain mixer

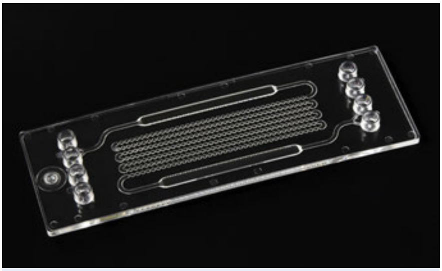


Fig. 198: Pearl chain mixer Fluidic 658

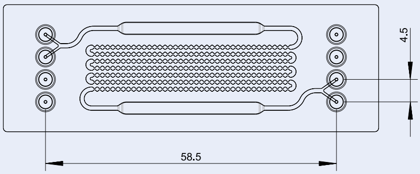


Fig. 199: Schematic drawing of pearl chain mixer Fluidic 658

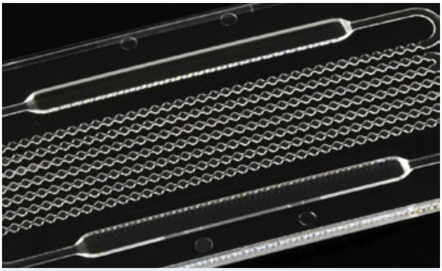


Fig. 200: Detail of the pearl chain mixer Fluidic 658 with Mini Luer interfaces

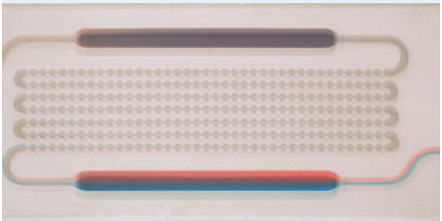


Fig. 201: Mixing of two colored liquids with the pearl chain mixer

Product Code for Fluidic 658	Description	Lid Thickness [µm]	Material	Price [€/chip] 1+	10+	100+
10000759	Pearl-chain mixer	125	Topas	42.20	34.30	26.10
10000760	Pearl-chain mixer	175	PC	42.20	34.30	26.10

3.11.1.6 Passive mixer – 3D serpentine mixer

The 3D serpentine mixer chip Fluidic 1079 possesses four identical micromixing units. Each unit features three inlet ports and one outlet port. Those ports come in Mini Luer format. The mixing channel is characterized by a sequence of directional changes in all three dimensions.

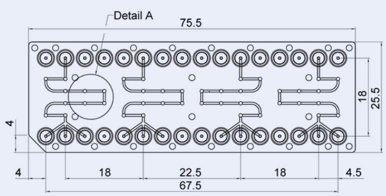


Fig. 202: Schematic drawing of the 3D serpentine mixer

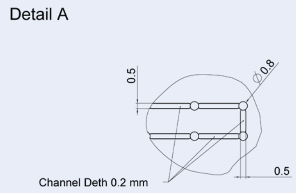


Fig. 203: Channel details of Fluidic 1079

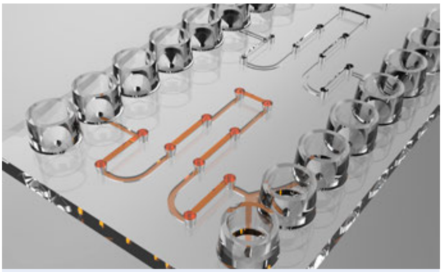


Fig. 204: The 3D serpentine mixer possesses Mini Luer interfaces and a mixing channel with multiple directional changes

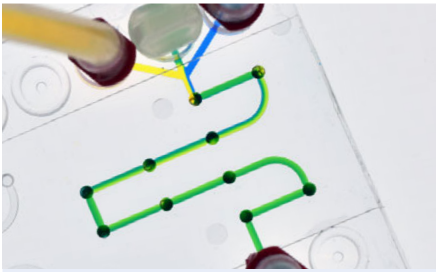


Fig. 205: Mixing of two colored liquids with the 3D serpentine mixer - channel volume is 12.93 µl in total

Product Code for Fluidic 1079	Description	Material	Lid Thickness [µm]	Price [€/chip] 1+	10+	100+
10001477	3D serpentine mixer	Zeonor	188	42.20	34.30	26.10
10001480	3D serpentine mixer	PC	175	42.20	34.30	26.10

3.11.1.7 Passive mixer – Snowman mixer

The snowman mixer chip possesses eight "snowman" mixing units. As oppose to most other micromixers, the snowman mixer is not intended for mixing in flow-through mode but rather enables mixing of a preloaded sample (on snowman head) with a diluent to result in a 1 in 10 dilution.

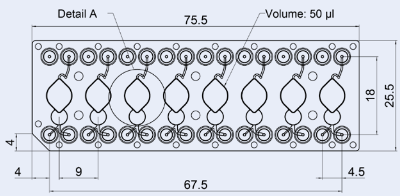


Fig. 206: Schematic drawing of snowman mixer Fluidic 1108

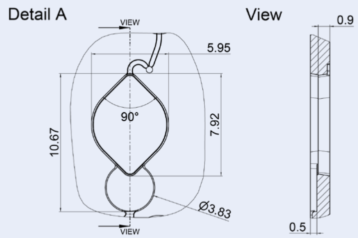


Fig. 207: Schematic snowman chamber details

Fig. 208: The snowman mixer possesses Mini Luer interfaces and eight mixing units

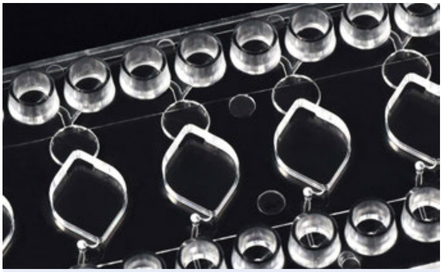


Fig. 209: Snowman head, to be preloaded with 5 μl sample, subsequent addition of 45 μl diluent enables efficient mixing in snowman belly

Product Code for Fluidic 1108	Description	Material	Lid Thickness [μm]	Price [€/chip] 1+	10+	100+
10001502	Snowman mixer	Topas	140	42.20	34.30	26.10

3.11.2 Active mixer

3.11.2.1 Active mixer - Stir bar actuated mixer

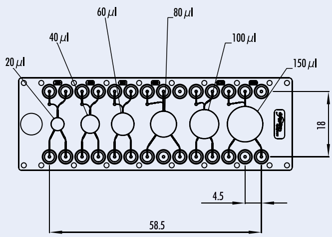


Fig. 210: Drawing of micro mixer chip with mixing chambers Fluidic 286 with Mini Luer interfaces

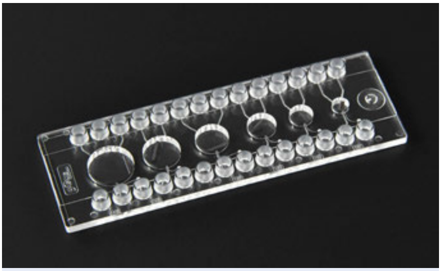


Fig. 211: Micro mixer with magnetic stir bars for active mixing

Product Code for Fluidic 286	Chamber volume						Chamber depth	Lid Thickness	Material	Price [€/chip]	
	[µl]	[µl]	[µl]	[µl]	[µl]	[µl]	[mm]	[µm]		1+	10+
10001803	20	40	60	80	100	150	1.5	175	PMMA	82.50	63.50
10000077	20	40	60	80	100	150	1.5	188	Zeonor	82.50	63.50

3.11.2.2 Active mixer – Finger pump mixer

This mixer contains a variety of mixing units. On the one hand, mixing of up to three liquids is facilitated by the pearl-chain unit, on the other hand an integrated finger pump can be used to displace air and in this way move liquid forth and back in the channel system.

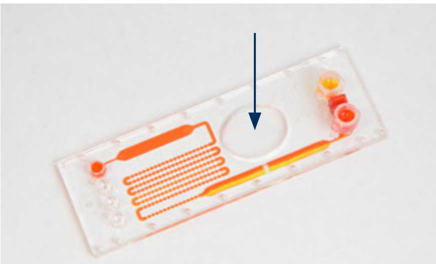


Fig. 212: Finger pump mixer Fluidic 999 working principle. Further mixing can be managed by utilizing the pumping unit (arrow)

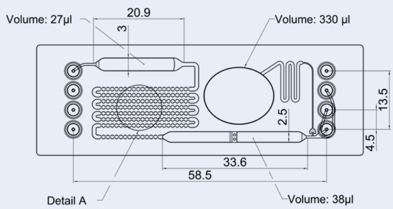


Fig. 213: Detailed schematic drawing of finger pump mixer Fluidic 999

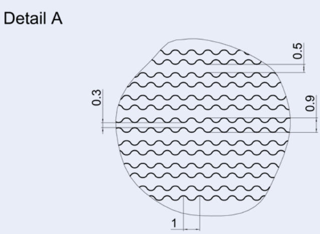


Fig. 214: Detailed schematic drawing of pearl-chain mixing unit of Fluidic 999

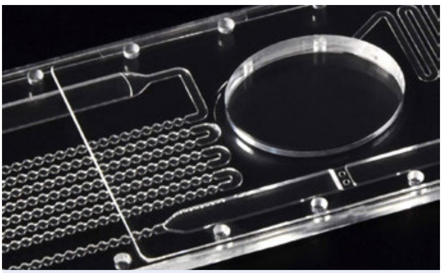


Fig. 215: Detail of the finger pump mixer Fluidic 999

Product Code for Fluidic 999	Description	Lid Thickness [µm]	Material	Price [€/chip] 1+	10+	100+
10001330	Finger pump mixer	140	Topas	42.50	31.40	24.90
10001331	Finger pump mixer	188	Zeonor	42.50	31.40	24.90

3.12 Titer plates in microscopy slide format

Our micro- or nanowell plates have the format of a microscopy slide (75.5 mm x 25.5 mm x 1.5 mm) and include cavities with different shapes and volumes.

3.12.1 Nanotiter plate

On our nanowell plates, three well arrays with wells of different edge lengths are placed. The arrays have 14 x 14 (well spacing of 1,125 µm), 28 x 28 (well spacing of 562.5 µm), and 60 x 60 (well spacing of 281.25 µm) single wells.

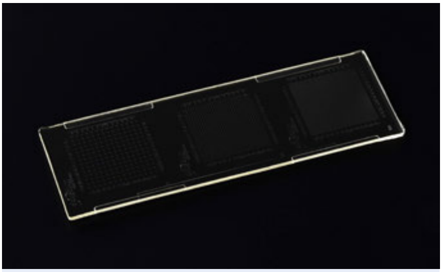


Fig. 216: Nanotiter plate Fluidic 18

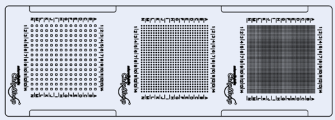


Fig. 217: Schematic drawing of naotiter plate Fluidic 18

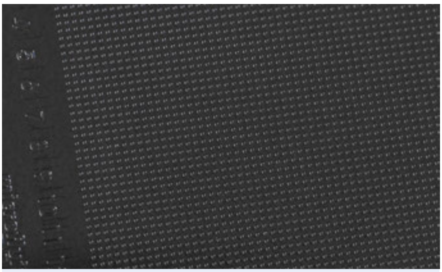


Fig. 218: Smallest wells of nanotiter plate Fluidic 18

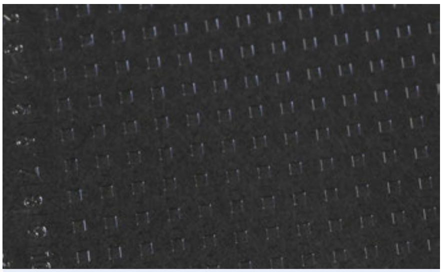


Fig. 219: Largest wells of nanotiter plate Fluidic 18

Product Code for Fluidic 18	Well Depth [µm]	Well Size [µm] Structure 1 Top	1 Bot.	2 Top	2 Bot.	3 Top	3 Bot.	Well Spacing [µm] Structure 1	2	3	Mate-rial	Price [€/chip] 1+	10+	50+	100+	500+
10000199	20	124	96	224	196	424	396	281.25	562.5	1125	PMMA	40.00	30.00	9.00	7.00	5.20
10000200	20	124	96	224	196	424	396	281.25	562.5	1125	Topas	45.00	35.00	14.00	8.00	5.40
10000201	20	124	96	224	196	424	396	281.25	562.5	1125	PC	40.00	30.00	9.00	7.00	5.20
10000202	20	124	96	224	196	424	396	281.25	562.5	1125	Zeonor	45.00	35.00	14.00	8.00	5.40
10000203	20	124	96	224	196	424	396	281.25	562.5	1125	Zeonex	45.00	35.00	14.00	8.00	5.40

3.12.2 18-well chip

The 18-well chip (119 µl/well) features the spacing of a 96-well microtiter plate, namely 9 mm, and is available in different materials and in transparent and colored versions. It can be used with our adapter frame in microtiter-plate format that is made as a special adapter for microfluidic chips in microscopy slide format.

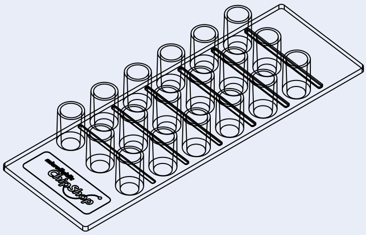


Fig. 220: Schematic drawing of the 18-well titer plate Fluidic 141

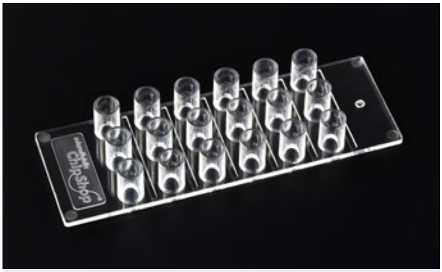


Fig. 221: 18-well chip Fluidic 141

Product Code for Fluidic 141	Well Volume [µl]	Material	Price [€/chip]		
			1+	10+	100+
10000883	119	Topas	20.00	15.00	5.40
10000907	119	Topas, black	20.00	15.00	5.40
10000885	119	PS	20.00	15.00	5.40
10000905	119	PS, white	20.00	15.00	5.40
10000906	119	PS, black	20.00	15.00	5.40
10000250	119	Zeonor	20.00	15.00	5.40
10000251	119	Zeonor, white	20.00	15.00	5.40
10000884	119	Zeonor, black	20.00	15.00	5.40

3.12.2 24-well chip

The 24-well chip is ideal to evaluate different parameters of your microfluidic experiment, such as material choice. The chip is available in a variety of materials and features 24 wells with 50 µl volume each.

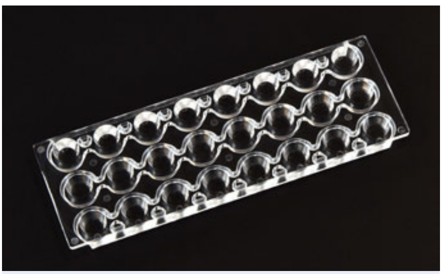


Fig. 222: Fluidic 1105 with 24 individual wells

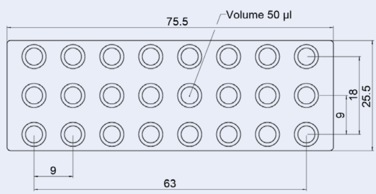


Fig. 223: Each well of Fluidic 1105 can hold up to 50 µl

Product Code for Fluidic 1105	Well Volume [µl]	Material	Price [€/chip] 1+	10+	100+
10001545	50	Topas	20.00	15.20	5.45
10001762	50	PC	20.00	15.20	5.45
10001761	50	PS	20.00	15.20	5.45
10001763	50	Zeonor	20.00	15.20	5.45
10001544	50	Zeonex	20.00	15.20	5.45

3.12.4 65-well chip

This 65-well chip (25.9 µl/well) has the spacing of a 384 well plate, namely 4.5 mm. It can be used with the micro-titer plate sized adapter frames described in the accessories chapter. The chip can be used to carry out reactions or as a source plate for spotting experiments, e.g. with the instrumentTWO spotter shown in the instrument chapter.

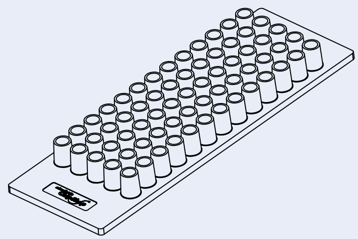


Fig. 224: 65-well chip Fluidic 383 – microscopy slide format

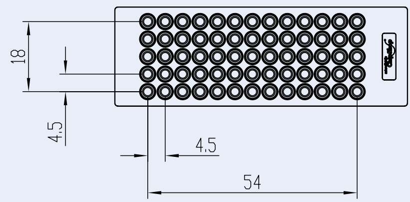


Fig. 225: Details 65-well chip Fluidic 383

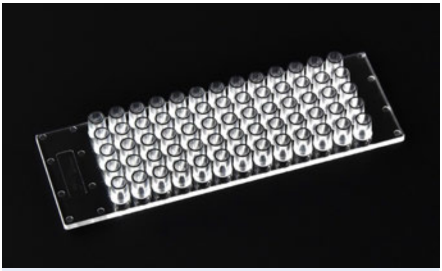


Fig. 226: 65-well chip Fluidic 383

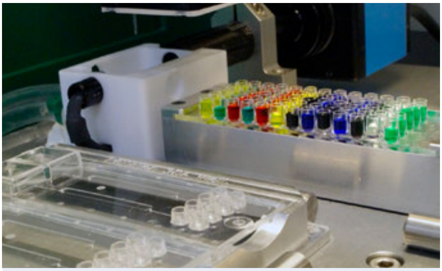


Fig. 227: 65-well chip used as source plate in spotter

Product Code for Fluidic 383	Well Volume [µl]	Material	Price [€/chip] 1+	10+	100+
10000252	25.9	Zeonor	20.00	15.20	5.45
10000253	25	PP	20.00	15.20	5.45

3.13 Droplet generator chips and integrated droplet generation solutions

A family of droplet generator chips in various designs allows for the generation of droplets in different sizes and frequencies. Integrated chips exceeding the droplet generation function e.g. by combining droplet generation with droplet storage for subsequent optical analysis allowing a wide variety of experiments.

All droplet generators possess microscopy slide format and can be operated in both pumping and suction modes.

Furthermore, our droplet generator chips either possess Mini Luer or Luer interfaces for a convenient connection of the chip with an appropriate pumping system. Below an overview of all available droplet generators and their key features is given.

Material compatibility: Please be aware of material compatibility when setting up your droplet generation experiment. When utilizing silicone-based oils we recommend the use of Topas chips, while mineral oils require chips made from PC. Fluorinated oils can be used with both materials.

Fluidic Design	Interface Type	Nozzle Sizes [μm]	Single-Cross	Double-Cross	Generator Units /Chip	Droplet Storage
162	Mini Luer	70	Yes	Yes	1	No
163	Mini Luer	140	Yes	Yes	1	No
285	Mini Luer	50; 70; 80; 100	Yes	No	5	No
440	Mini Luer	50; 60; 70; 80	Yes	No	8	No
488	Mini Luer	74	Yes	Yes	1	Yes
536	Luer	38	Yes	Yes	3	No
537	Luer	38	Yes	No	4	No
719	Mini Luer	82	Yes	Yes	1	Yes
912	Mini Luer	80	Yes	No	8	No
947	Mini Luer	10; 15; 20; 30	Yes	No	8	No
1032	Mini Luer	100	Yes	Yes	3	No
1114	Mini Luer	50; 60	Yes	No	8	Yes
1147	Mini Luer	70; 80	Yes	No	4	Yes
1480	Mini Luer	80	Yes	Yes	2	No
1505	Mini Luer	50	Yes	Yes	4	No

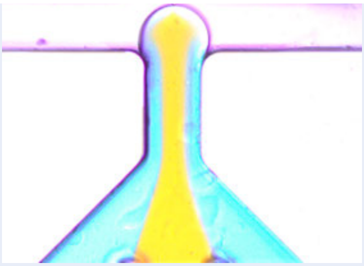


Fig. 228: Droplet Generator Fluidic 163 with two consecutive channel crossings

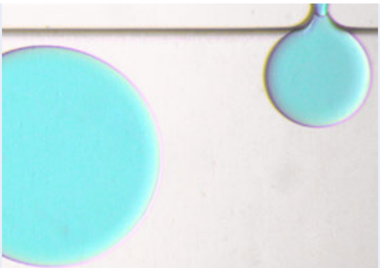


Fig. 229: Droplet generation using Fluidic 285 - largest nozzle of 100 μm with droplet collection in 1 mm channel

3.13.1 Droplet generator chips – One channel designs

Droplet generators Fluidic 162 and Fluidic 163 feature a double channel crossing in the droplet generation region and one droplet collection channel. Being similar in design and possessing several inlet and outlets with Mini Luer interfaces, the main differences between Fluidic 162 and Fluidic 163 are the channel widths.

Like most droplet generators with a double-cross geometry, they can also be used for single-cross experiments by simply not connecting respective channels but closing their interfaces with plugs.

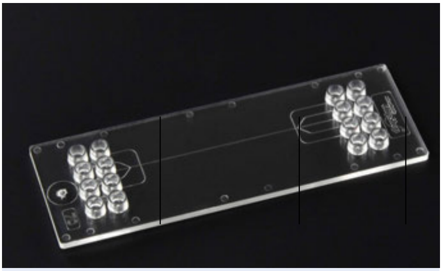


Fig. 230: Droplet generator Fluidic 162

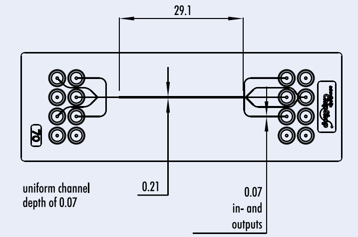


Fig. 231: Channel dimensions of droplet generator Fluidic 162

Product Code for Fluidic 162	Input Channel Width [µm]	Collection Channel Width [µm]	Channel Depth [µm]	Droplet generation	Lid Thickness [µm]	Material	Price [€/chip] 1+	10+	100+
10000005	70	210	70	W/W/O	140	Topas	42.20	34.40	26.10
10000003	70	210	70	W/W/O	175	PC	42.20	34.40	26.10

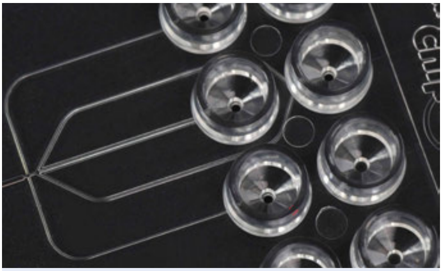


Fig. 232: Detail of droplet generator Fluidic 163

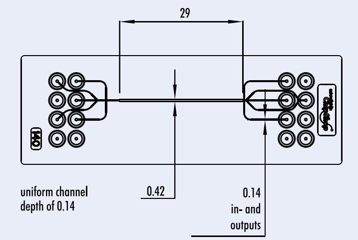


Fig. 233: Channel dimensions droplet generator Fluidic 163

Product Code for Fluidic 163	Input Channel Width [µm]	Collection Channel Width [µm]	Channel Depth [µm]	Droplet generation	Lid Thickness [µm]	Material	Price [€/chip] 1+	10+	100+
10000006	140	420	140	W/W/O	140	Topas	42.20	34.40	26.10
10000004	140	420	140	W/W/O	175	PC	42.20	34.40	26.10

3.13.2 Droplet generator chips – Multi channel designs

3.13.2.1 Droplet generator chips – Multi channel designs – Single-cross geometry

Droplet generator chips of this type provide several functional droplet generator units of the same geometry on one chip.

Droplet generator chip Fluidic 537 with a single-cross geometry and Luer interfaces was specifically developed to be used in both pumping and suction mode. The chip contains four identical droplet generation units with a nozzle size of 38 μm.

In contrast, Fluidic 912 features Mini Luer interfaces and eight identical droplet generation units with a channel dimension of 80 μm at the droplet formation region.

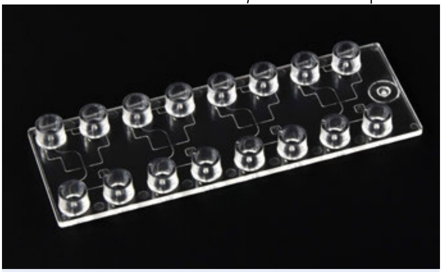


Fig. 234: Droplet generator chip Fluidic 537

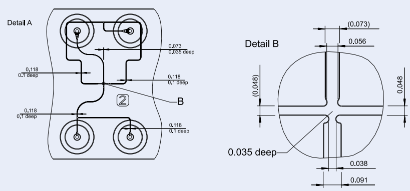


Fig. 235: Droplet generator chip Fluidic 537 – detail channel dimensions (left) and cross-section (right)

Product Code for Fluidic 537	Surface Treatment	Droplet generation	Lid Thickness [μm]	Material	Price [€/chip]		
					1+	10+	100+
10000466	Untreated - hydrophobic surface	W/O	140	Topas	42.20	34.40	26.10
10000467	Untreated - hydrophobic surface	W/O	175	PC	42.20	34.40	26.10
10002124	Treated - hydrophilic surface	O/W	140	Topas	45.20	36.40	27.80
10001535	Treated - hydrophilic surface	O/W	175	PC	45.20	36.40	27.80

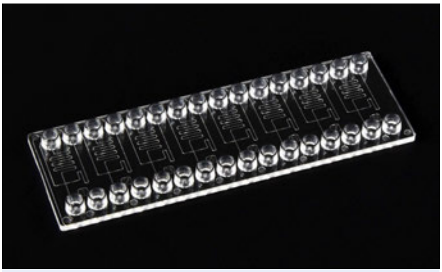


Fig. 236: Droplet generator chip Fluidic 912 with Mini Luer interfaces

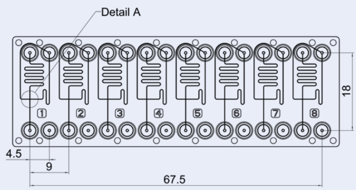


Fig. 237: Droplet generator chip Fluidic 912

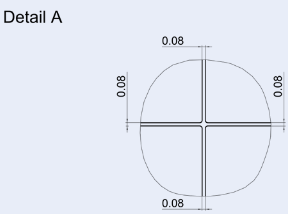


Fig. 238: Droplet generator chip Fluidic 912 – detail cross element

Product Code for Fluidic 912	Surface Treatment	Droplet generation	Lid Thickness [µm]	Material	Price [€/chip] 1+	10+	100+
10001985	Untreated - hydrophobic surface	W/O	140	Topas	42.20	34.40	26.10
10001333	Untreated - hydrophobic surface	W/O	175	PC	42.20	34.40	26.10
10002125	Treated - hydrophilic surface	O/W	140	Topas	45.20	36.40	27.80
10001688	Treated - hydrophilic surface	O/W	175	PC	45.20	36.40	27.80

3.13.2.2 Droplet generator chips – Multi channel designs – Double-cross geometry

Droplet generator chips with a double-cross geometry allow for the generation W/W/O emulsions, where mixing of two (or more) aqueous solutions and subsequent encapsulation takes place in a single step on-chip. There are three designs with varying channel sizes available. All of the feature a flow-focusing junction at the second cross, allowing for the formation of droplets in a defined size and with high-throughput.
The double-cross chips serve a variety of different applications, such as such as e.g. mixing of cells with a lysis buffer and immediate encapsulation in a droplet for further downstream analysis and optical read-out.

Please note that, Fluidic 536 possesses Luer interfaces while Fluidic 1032 and 1505 areequipped with Mini Luer interfaces, to seamlesly connect to a pump system of choice. For W/W/O emulsion experiments, at least three individual pump channels are required.

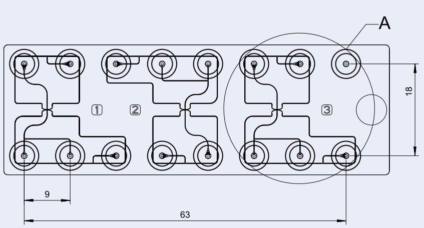


Fig. 239: Schematic drawing of droplet in droplet generator chip Fluidic 536 with Luer interfaces

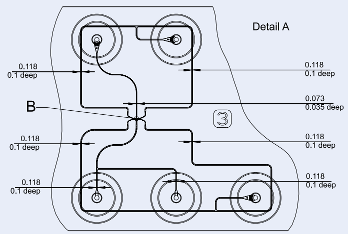


Fig. 240: Droplet in droplet generator chip Fluidic 536 – channel dimension

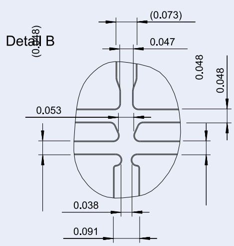


Fig. 241: Droplet in droplet generator chip Fluidic 536 – detail channel intersection element

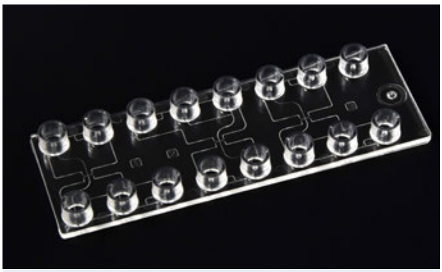


Fig. 242: Droplet generator chip Fluidic 536

Product Code for Fluidic 536	Droplet generation	Lid Thickness [µm]	Material	Price [€/chip] 1+	10+	100+
10000433	W/W/O	140	Topas	42.20	34.40	26.10
10000509	W/W/O	175	PC	42.20	34.40	26.10

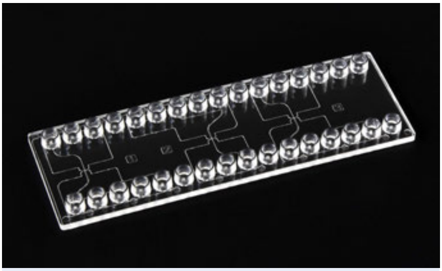


Fig. 243: Droplet in droplet generator chip Fluidic 1032 with Mini Luer interfaces

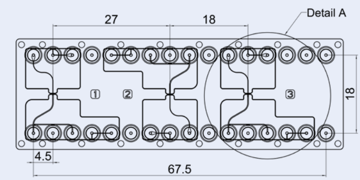


Fig. 244: Detailed schematic drawing droplet generator chip Fluidic 1032 – channel dimension

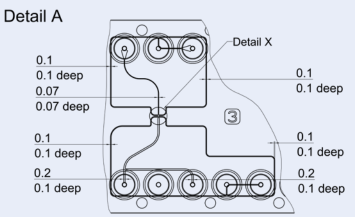


Fig. 245: Droplet in droplet generator chip Fluidic 1032 – channel dimension

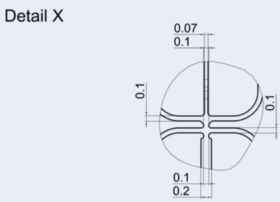


Fig. 246: Droplet in droplet generator chip Fluidic 1032 – detail channel intersection element

Product Code for Fluidic 1032	Droplet generation	Material	Lid Thickness [µm]	Price [€/chip] 1+	10+	100+
10001334	W/W/O	Topas	140	42.20	34.40	26.10
10001335	W/W/O	PC	175	42.20	34.40	26.10

Fluidic 1505 consists of four identical droplet generator units. Each unit provides a double channel crossing, which is ideal for mixing of two aqueous phases. The mixing ratio can be adjusted by adjusting the flow rate ratio. After mixing, W/W/O emulsions are generated at the downstream flow focusing junction.
Among many other applications, the chips enable the investigation of dose-dependent effects of drugs on individual cells in high throughput using million-fold small reaction spaces. The chip features performance-enhancing bubble- and particle trapping structures right at the Mini Luer interfaces.

Fig. 247: Droplet generator chip Fluidic 1505 with Mini Luer interfaces

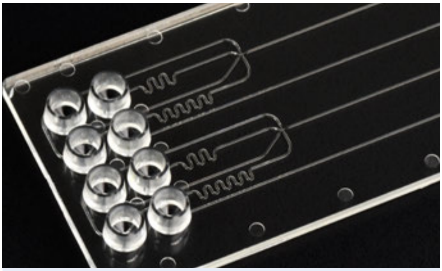


Fig. 248: Detail of the droplet generator chip Fluidic 1505

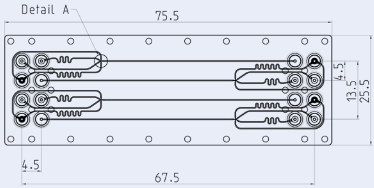


Fig. 249: Schematic drawing of droplet generator chip Fluidic 1505

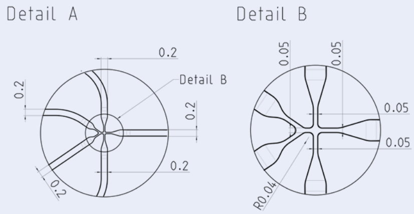


Fig. 250: Droplet generator chip Fluidic 1505 - detail channel intersection element

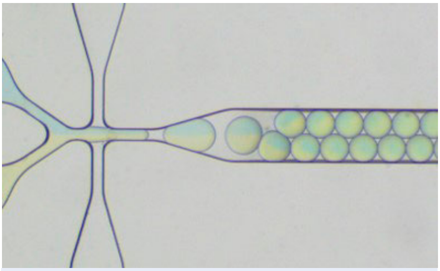


Fig. 251: Formation of large droplets from a mixed aqueous solution (W/W/O) in chip Fluidic 1505

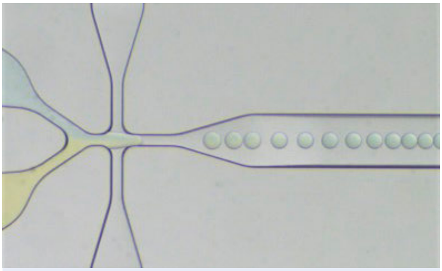


Fig. 252: Formation of small droplets from a mixed aqueous solution (W/W/O) in chip Fluidic 1505

Product Code for Fluidic 1505	Droplet generation	Material	Lid Thickness [µm]	Price [€/chip]		
				1+	10+	100+
10002065	W/W/O	Topas	140 µm	42.20	34.40	26.10
10002066	W/W/O	PC	175 µm	42.20	34.40	26.10

3.13.2.3 Droplet generator chips – Multi channel designs – Double emulsion

The double emuslion droplet chip Fluidic 1480 provides two droplet generator units with double-cross geometry, that have varying channel/nozzle sizes at the second cross.
It comes with a specific surface coating that allows for the generation of double emulsions, such as the inclusion of droplets or cells deriving from the first channel intersection in a further droplet shell at the second channel intersection.
Each unit consists of a two crossings, each with a flow-focusing geometry, that are connected by a meander channel to generate W/O/W emulsions in a single step. To generate water-in-oil droplets in an aqueous continuous liquid, the chips are provided with a partially hydrophilic coating. However, this chip can also be used without pretreatment to mix two aqueous phases through the meander structures and to generate W/W/O droplets.
Fluidic 1480 features standard Mini Luer interfaces to seamlesly connect to a pump system of choice. For double emulsion experiments, at least three individual pump channels are required.

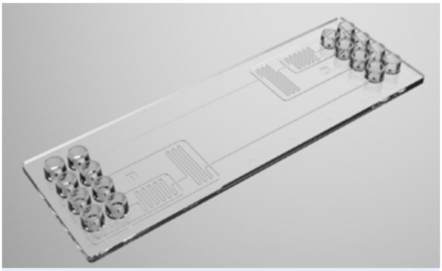


Fig. 253: Double emulsion droplet generator chip Fluidic 1480 with Mini Luer interfaces

Fig. 254: Detail of double emulsion droplet generator chip Fluidic 1480

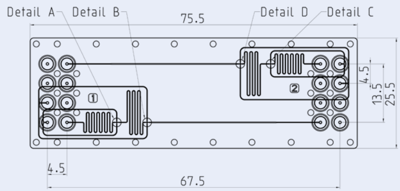


Fig. 255: Schematic drawing of droplet generator chip Fluidic 1480

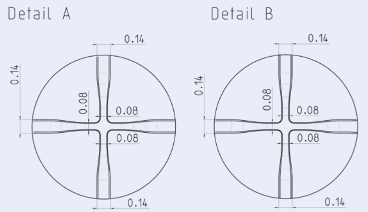


Fig. 256: Droplet generator chip Fluidic 1480 - detail channel intersection element

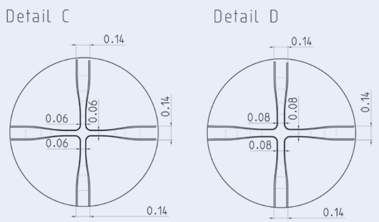


Fig. 257: Droplet generator chip Fluidic 1480 - detail channel intersection element

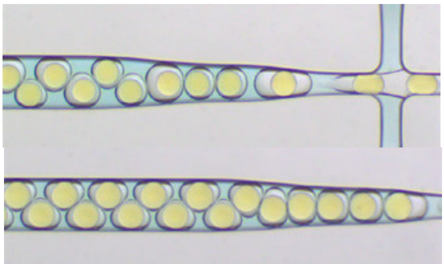


Fig. 258: Formation of double emulsions (W/O/W) at the second flow focusing junction of chip Fluidic 1480

Product Code for Fluidic 1480	Surface Treatment	Droplet generation	Material	Lid Thickness [µm]	Price [€/chip]		
					1+	10+	100+
10002061	Untreated - hydrophobic surface	W/W/O	Topas	140 µm	42.20	34.40	26.10
10002062	Untreated - hydrophobic surface	W/W/O	PC	175 µm	42.20	34.40	26.10
10002106	Treated - Partial surface treatment	W/O/W	Topas	140 µm	67.80	51.20	36.90
10002107	Treated - Partial surface treatment	W/O/W	PC	175 µm	67.80	51.20	36.90

3.13.2.3 Droplet generator chips – Multi channel designs – Various design options

With this multichannel design several design options to generate droplets with different volumes are implemented. Main channel as well as entrance channel vary in diameter enabling a large set of experiments. Fluidic 285 features Mini Luer interfaces.

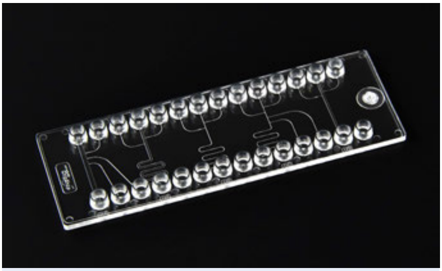


Fig. 259: Droplet generator chip Fluidic 285

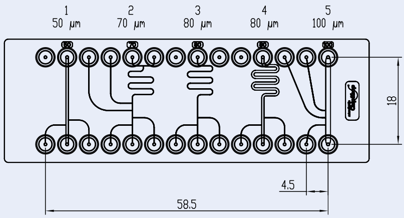


Fig. 260: Details droplet generator chip Fluidic 285

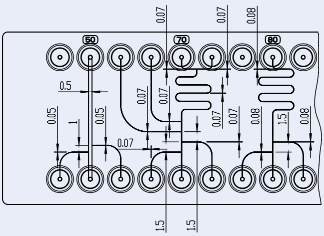


Fig. 261: Details of channel dimensions and off-sets of structures 1 – 3 of chip Fluidic 285

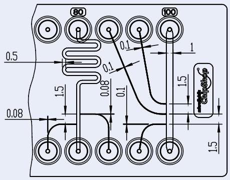


Fig. 262: Details of channel dimensions and off-sets of structures 4 – 5 of chip Fluidic 285

Fig. 263: Detail of the droplet generator Fluidic 285

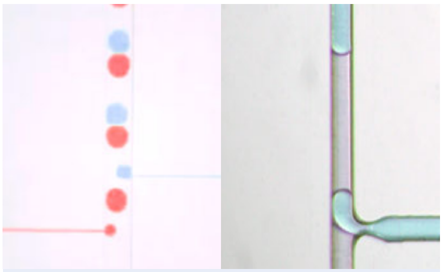


Fig. 264: Example for droplet generation with droplet generation unit 1 on Fluidic 285

Product Code for Fluidic 285	Surface Treatment	Droplet generation	Lid Thickness [µm]	Material	Price [€/chip]		
					1+	10+	100+
10000175	Untreated - hydrophobic surface	W/O	140	Topas	42.20	34.40	26.10
10000176	Untreated - hydrophobic surface	W/O	175	PC	42.20	34.40	26.10
10002126	Treated - hydrophilic surface	O/W	140	Topas	45.20	36.40	27.80
10001498	Treated - hydrophilic surface	O/W	175	PC	45.20	36.40	27.80

3.13.2.4 Droplet generator chips – Multi channel design – Droplet size variation

These droplet generator designs combine size variations of one main design for the evaluation of generated droplet size under the desired conditions.

For this purpose, we offer two droplet generator chips with similar design to evaluate droplet sizes. Each chip features eight individual droplet generator units and Mini Luer interfaces. Fluidic 440 is designed to generate larger droplets with channel dimensions at the droplet formation region of 80 μm, 70 μm, 60 μm and 50 μm channel width and height. In contrast, Fluidic 947 generates smaller droplets with channel dimensions at the droplet formation region of 30 μm, 20 μm, 15 μm and 10 μm channel width and height. Each size version comes with two different outlet channel widths.

Fig. 265: Droplet generator Fluidic 440 – droplet size variation - interfaced with Mini Luer to fluid connectors and tubing

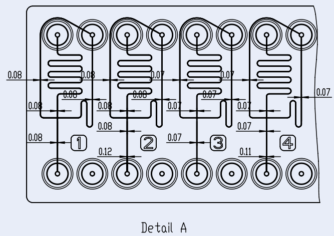


Fig. 266: Droplet generator – droplet size variation – details structures 1 - 4

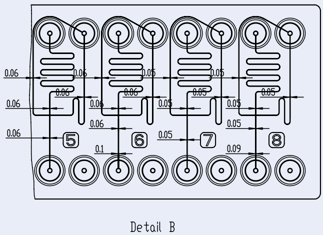


Fig. 267: Droplet generator – droplet size variation – details structures 5 - 8

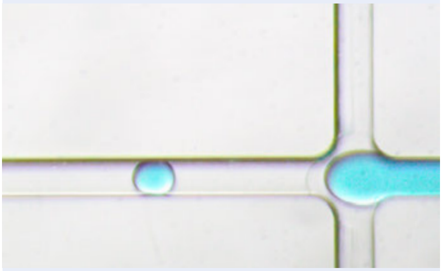


Fig. 268: Droplet generation at single channel crossing of Fluidic 440

Product Code for Fluidic 440	Surface Treatment	Droplet generation	Lid Thickness [μm]	Material	Price [€/chip] 1+	10+	100+
10000040	Untreated - hydrophobic surface	W/O	140	Topas	42.20	34.40	26.10
10000174	Untreated - hydrophobic surface	W/O	175	PC	42.20	34.40	26.10
10002127	Treated - hydrophilic surface	O/W	140	Topas	45.20	36.40	27.80
10001631	Treated - hydrophilic surface	O/W	175	PC	45.20	36.40	27.80

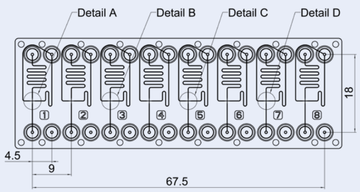


Fig. 269: Droplet generator Fluidic 947 – droplet size variation

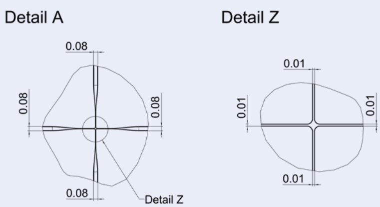


Fig. 270: Droplet generator Fluidic 947– droplet size variation – details structures 1 and 2

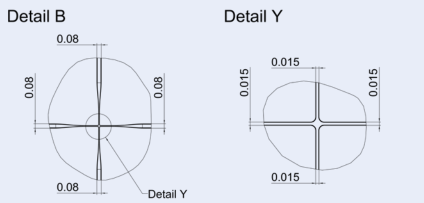


Fig. 271: Droplet generator Fluidic 947– droplet size variation – details structures3 and 4

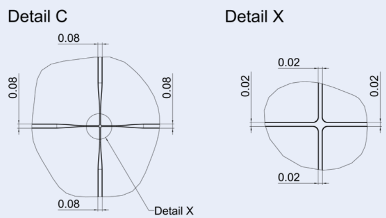


Fig. 272: Droplet generator Fluidic 947– droplet size variation – details structures 5 and 6

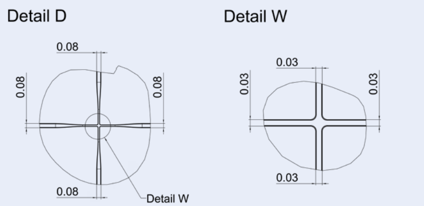


Fig. 273: Droplet generator Fluidic 947– droplet size variation – details structures 7 and 8

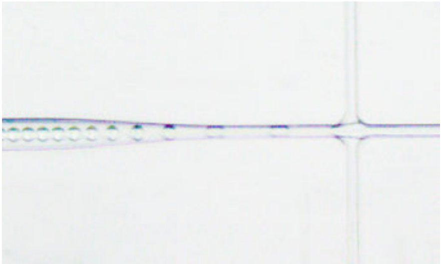


Fig. 274: Droplet generation at a single crossing of Fluidic 947

Product Code for Fluidic 947	Surface Treatment	Droplet generation	Lid Thickness [µm]	Material	Price [€/chip]		
					1+	10+	100+
10001972	Untreated - hydrophobic surface	W/O	140	Topas	42.20	34.40	26.10
10001337	Untreated - hydrophobic surface	W/O	175	PC	42.20	34.40	26.10
10001984	Treated - hydrophilic surface	O/W	140	Topas	45.20	36.40	27.80
10002128	Treated - hydrophilic surface	O/W	175	PC	45.20	36.40	27.80

3.13.3 Droplet generation and storage chips

These droplet generation chips combine the generation of the droplets with the storage and capture of single droplets for optical analysis.

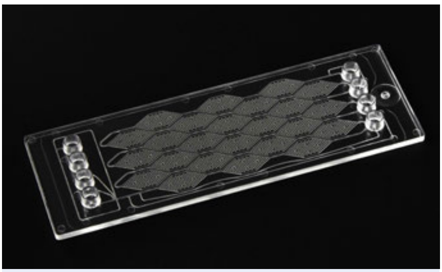


Fig. 275: Droplet generator chip Fluidic 488 with storage function

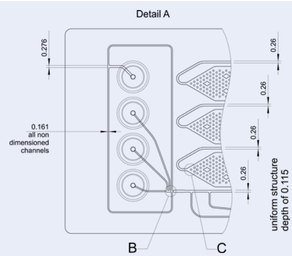


Fig. 276: Droplet in droplet generator and storage chip Fluidic 488 – detail channel dimensions

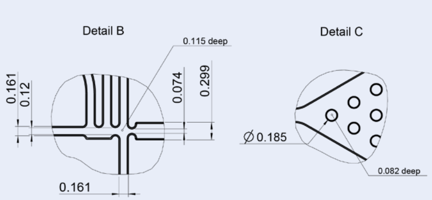


Fig. 277: Droplet in droplet generator and storage chip Fluidic 488 – detail channel intersection and storage element

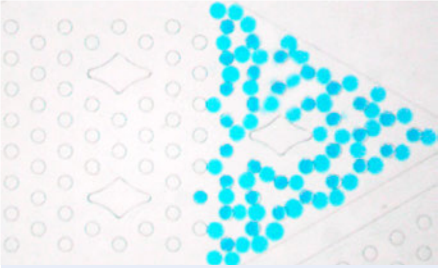


Fig. 278: Detail of one droplet storage unit of Fluidic 488 - starting to fill with blue colored droplets

Product Code for Fluidic 488	Droplet generation	Material	Lid Thickness [µm]	Price [€/chip] 1+	10+	100+
10000510	W/W/O	Topas	140 µm	42.20	34.40	26.10
10000511	W/W/O	PC	175 µm	42.20	34.40	26.10

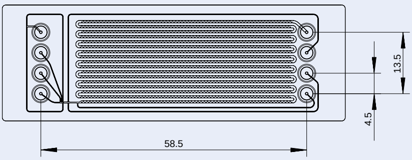


Fig. 279: Schematic drawing of droplet generation and storage chip – Fluidic 719

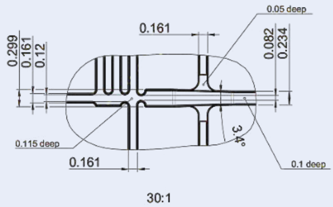


Fig. 280: Droplet generation and storage chip Fluidic 719 – detail channel intersection

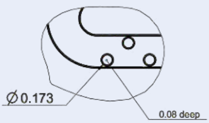


Fig. 281: Droplet generation and storage chip Fluidic 719 – detail of storage element

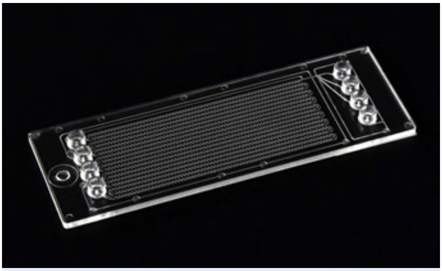


Fig. 282: Droplet generation and storage chip – Fluidic 719

Product Code for Fluidic 719	Droplet generation	Material	Lid Thickness [µm]	Price [€/chip] 1+	10+	100+
10000751	W/W/O	Topas	140 µm	42.20	34.40	26.10
10000752	W/W/O	PC	175 µm	42.20	34.40	26.10

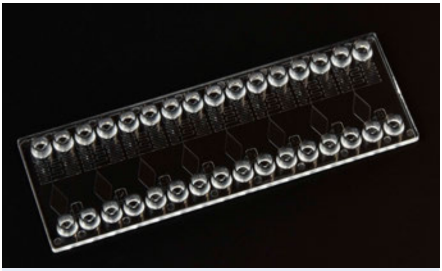


Fig. 283: Doplet generation chip Fluidic 1114 with observation chambers

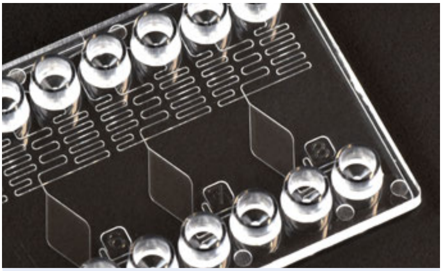


Fig. 284: Detail of doplet generation chip Fluidic 1114 with observation chambers

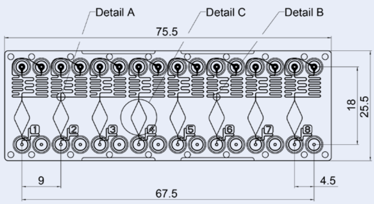


Fig. 285: Schematic drawing of droplet generation chip Fluidic 1114 with observation chambers

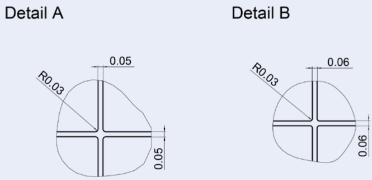


Fig. 286: Nozzle details of Fluidic 1114 with the two different nozzle dimensions: 50 µm and 60 µm

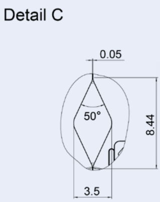


Fig. 287: Observation chambers of Fluidic 1114

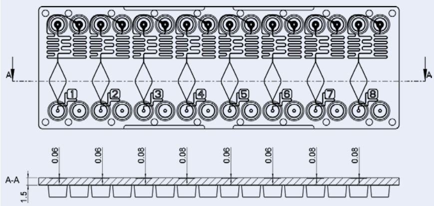


Fig. 288: Observation chambers of Fluidic 1114 are 60 µm and 80 µm deep

Product Code for Fluidic 1114	Surface Treatment	Droplet generation	Lid Thickness [µm]	Material	Price [€/chip]		
					1+	10+	100+
10001753	Untreated - hydrophobic surface	W/O	175	Topas	42.20	34.40	26.10
10001776	Untreated - hydrophobic surface	W/O	175	PC	42.20	34.40	26.10
10002129	Treated - hydrophilic surface	O/W	175	Topas	45.20	36.40	27.80
10002130	Treated - hydrophilic surface	O/W	175	PC	45.20	36.40	27.80

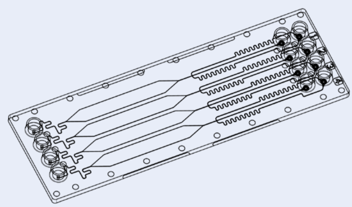


Fig. 289: Schematic drawing of droplet generation chip Fluidic 1147 with observation chambers

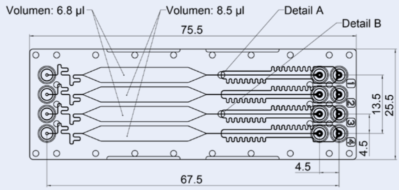


Fig. 290: Fluidic 1147 possesses four functional droplet units and Mini Luer interfaces

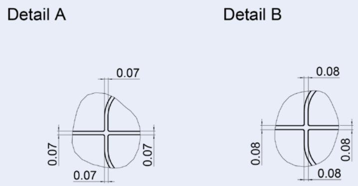


Fig. 291: Observation chambers of Fluidic 1147 are 80 μm and 100 μm deep, nozzles are 70 μm and 80 μm

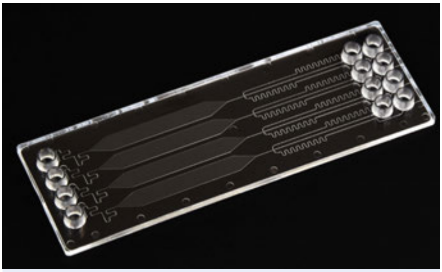


Fig. 292: Droplet generation chip Fluidic 1147 with observation chambers

Product Code for Fluidic 1147	Surface Treatment	Droplet generation	Lid Thickness [μm]	Material	Price [€/chip] 1+	10+	100+
10001754	Untreated - hydrophobic surface	W/O	175	Topas	42.20	34.40	26.10
10001777	Untreated - hydrophobic surface	W/O	175	PC	42.20	34.40	26.10
10001927	Treated - hydrophilic surface	O/W	175	Topas	45.20	36.40	27.80
10001929	Treated - hydrophilic surface	O/W	175	PC	45.20	36.40	27.80

3.14 Meander and continuous-flow PCR chips

On the format of a microscopy slide (75.5 mm x 25.5 mm x 1.5 mm), long meandering channels are implemented. As interfaces, olives are used to directly connect tubing. If more than two interfaces are required, 28 interfaces are part of the platform.

For the basic principle of continuous-flow PCR please refer to Kopp M.U., et al., Chemical amplification: continuous-flow PCR on a chip, *Science*, Vol 288(5366), pp. 1046-8, 1998.

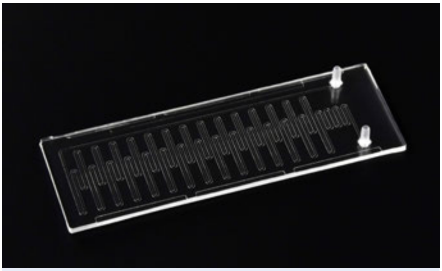


Fig. 293: 15-cycle chip Fluidic 47

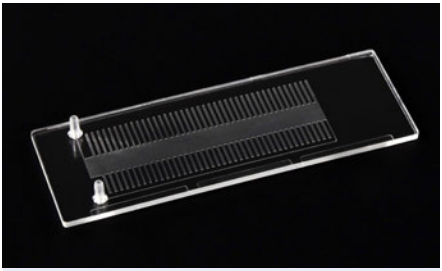


Fig. 294: 41-cycle chip Fluidic 708

Fig. 295: 40 cycle continuous-flow PCR chip Fluidic 243

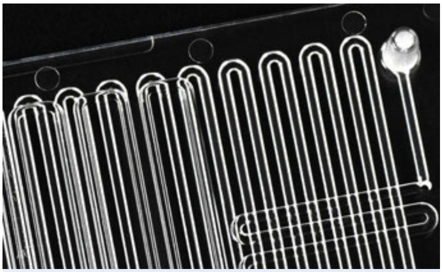


Fig. 296: Detail of the 40 cycle continuous-flow PCR chip Fluidic 243

Product Code	Fluidic	Lid Thickness [µm]	Material	Comments Design Channel Dimensions Width / Depth / Length	Price [€/chip]			
					1+	10+	100+	1000+
10000008	47	175	PC	15 cycles (1 inlet, 1 outlet) 500 µm / 100 µm / 810 mm	42.50	32.50	25.50	12.00
10000007	65	175	PC	36 cycles (2 inlets, 3 outlets) 220 µm / 100 µm / 1,257 mm	42.50	32.50	25.50	12.00
10000753	708	125	Topas	41 cycles (1 inlet, 1 outlet) 200 µm / 100 µm / 1,879 mm	42.50	32.50	25.50	12.00
10000745	708	175	PC	41 cycles (1 inlet, 1 outlet) 200 µm / 100 µm / 1,879 mm	42.50	32.50	25.50	12.00
10000010	243	175	PC	40 cycles (1 inlet, 1 outlet) 600 µm / 300 µm / 1,637 mm	42.50	32.50	25.50	12.00
10000011	243	188	Zeonor	40 cycles (1 inlet, 1 outlet) 600 µm / 300 µm / 1,637 mm	42.50	32.50	25.50	12.00

3.15 Sample preparation chips

Complex samples such as e.g. blood often require purificaton steps prior to further analysis. In this regard, one prominent procedure is sample preparation with the help of membranes, which can facilitate purfication and filtration.

3.15.1 Filtration chips

The fitration chip Fluidic 398 is based on the cross-flow membrane principle, i.e. two in- and outlet ports are located above and below a permeable membrane. In- and outlets offer interfaces with both Luer and Mini Luer. The filtration chip is provided with a standard membrane. However, upon request the platform can be equipped with customer-specific membranes. Please contact us for feasibility and pricing.

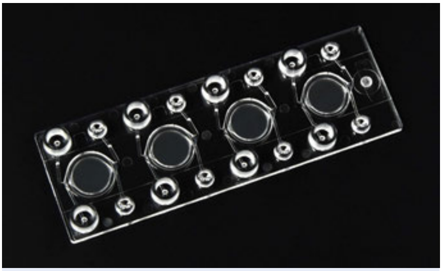


Fig. 297: Filtration chip Fluidic 398

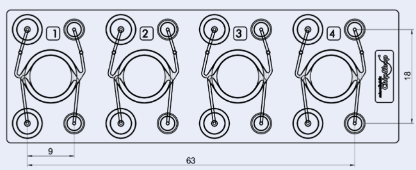


Fig. 298: Schematic drawing of the filtration chip Fluidic 398

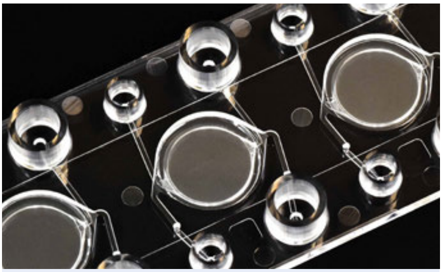


Fig. 299: Detail of the filtration chip Fluidic 398

Product Code for Fluidic 398	Description	Pore size [µm]	Lid Thickness [µm]	Material	Price [€/chip]		
					1+	10+	100+
10000022	Filtration chip	0.4	140	Topas	79.50	63.50	42.50

The filtration and separation chip Fluidic 1332 enables filtration, capture and concentration of e.g. cell populations or alike. A stream is lead through the membrane and captures larger components on the bottom of the chip, while smaller cells can pass through the membrane. Captured fractions can be monitored from below with an inverted microscope. Each individual chamber features a different height of the monitoring chamber below the membrane.

The off-the-shelf chip features a membrane with 8 µm pores. However, customed membrane integration can be realized. Please contact us for feasibility and pricing.

Fig. 300: Filtration and separation chip Fluidic 1332 featuring eight individual filtration units, inlet on top, outlets on the bottom

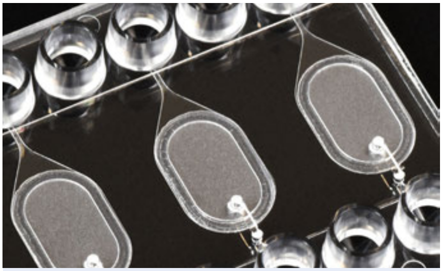


Fig. 301: Detail of filtration and separation chip Fluidic 1332

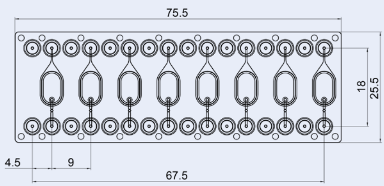


Fig. 302: Detail of filtration and separation chip Fluidic 1332

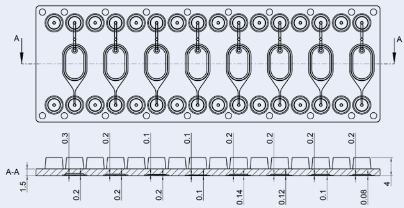


Fig. 303: Each filtration unit of Fluidic 1332 features a distinct height below and above the membrane

Product Code for Fluidic 1332	Description	Pore size [μm]	Lid Thickness [μm]	Material	Surface Treatment	Price [€/chip] 1+	10+
10001837	Filtration and separation chip	8 μm	140	Topas	-	115.35	79.60
10001840	Filtration and separation chip	8 μm	140	Topas	hydrophilized	118.35	82.10

3.15.2 Plasma/serum generation chips

The plasma/serum generation chip family was specifically developed to generate plasma/serum from whole blood.

While this application is rather prominent, these chips can be used for various other filtering applications by exchanging the membrane material and using various pore sizes. A range of different membranes is available at *microfluidic ChipShop* and can be integrated on request. Please contact our team at *sales@microfluidic-ChipShop.com* with your requirements.

For plasma generation chips with 10 mm diameter membranes, each membrane can generate roughly 12 – 15 μl plasma/serum out of 25 μl full blood. Each unit of these chips consists of a (Mini) Luer interface (1) for blood loading, a support channel with a cross-section of 300 μm × 100 μm (2) for the transfer of the blood on top of a separation membrane (3) that is fused into a chip-based chamber of 10 mm diameter, a plasma/serum collection channel (4) below the membrane, and a ventilation channel of 100 μm × 100 μm (5) also below the membrane. The vacuum is applied via the collection channel and a second interface (6) to the outer world. A third interface (7), which is closed during the sample loading, helps to smoothly release the slight vacuum if the membrane pores are blocked by the solid components of the blood such as erythrocytes, monocytes, platelets, or leucocytes. The chips are offered without (membrane chip 168) and with an additional venting line (membrane chip 200) to allow for an easier filling of the membrane chamber itself. Sample input can either be done by pipette or via a tank. Compatible tanks are Fluidic 833, 933, 934 or 639.

Due to a massively enlarged footprint of the membrane, the membrane chip Fluidic 1113 allows for the generation of larger volumes of plasma/serum. Depending on the blood sample achievable serum/plasma volumes range from 20 μl to 35 μl. Fluidic 783 combines both a rhombic membrane and a round membrane each with a 5 μl chamber.

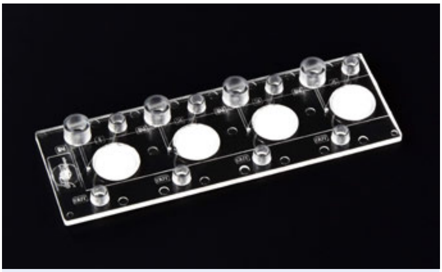


Fig. 304: Plasma/serum generation chip Fluidic 168 equipped with plasma generation membranes

Fig. 305: Close-up of one plasma/serum generation unit. The individual components are explained in the above text.

Fig. 306: Detail of the membrane chip Fluidic 168

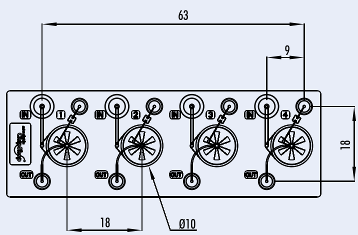


Fig. 307: Detail of membrane chip Fluidic 168

Product Code for Fluidic 168	Description	Membrane diameter [mm]	Surface Treatment	Material	Price [€/chip] 1+	10+	100+
10000242	Chip with 4 membranes	10	-	Topas	79.50	63.50	42.50
10000789	Chip with 4 membranes	10	hydrophilized	Topas	89.50	69.40	47.10

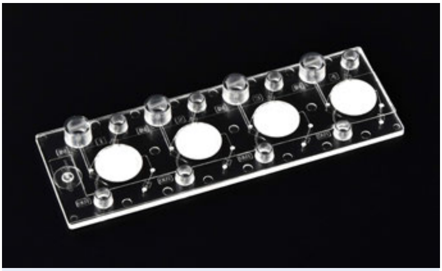


Fig. 308: Membrane chip Fluidic 200

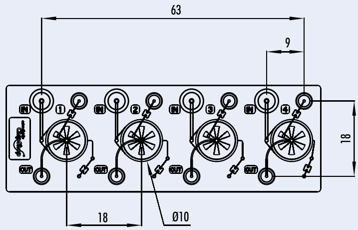


Fig. 309: Detail of membrane chip Fluidic 200

Product Code for Fluidic 200	Description	Membrane diameter [mm]	Surface Treatment	Material	Price [€/chip] 1+	10+	100+
10000021	Chip with 4 membranes	10	-	Topas	79.50	63.50	42.50
10000757	Chip with 4 membranes	10	-	PS	79.50	63.50	42.50
10000756	Chip with 4 membranes	10	hydrophilized	Topas	89.50	69.40	47.10
10000758	Chip with 4 membranes	10	hydrophilized	PS	89.50	69.40	47.10

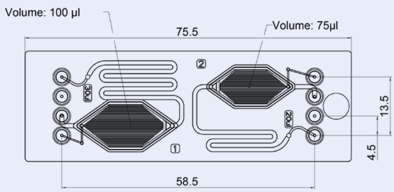


Fig. 310: Schematic drawing of membrane chip Fluidic 1113 with Mini Luer interfaces

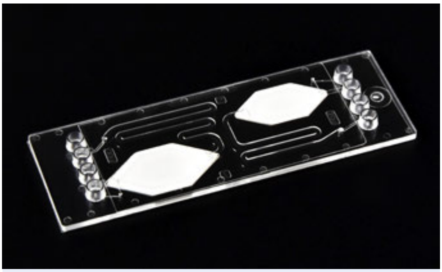


Fig. 311: Membrane chip Fluidic 1113

Product Code for Fluidic 1113	Description	Lid Thickness [µm]	Material	Surface Treatment	Price [€/chip] 1+	10+	100+
10001525	Plasma generation chip with two membranes	140	Topas	-	79.50	63.50	42.50
10001527	Plasma generation chip with two membranes	125	PS	-	79.50	63.50	42.50
10001583	Plasma generation chip with two membranes	140	Topas	hydrophilized	89.50	69.40	47.10
10001693	Plasma generation chip with two membranes	125	PS	hydrophilized	89.50	69.40	47.10

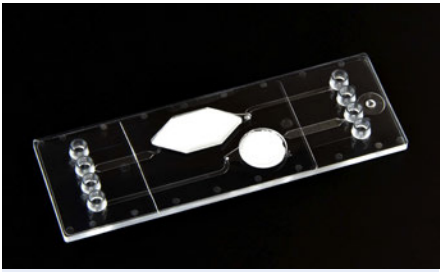


Fig. 312: Membrane chip Fluidic 783 with Mini Luer interfaces

Fig. 313: Detail of the membrane chip Fluidic 783 with two separate plasma generation units - one round and one rhombic

Product Code for Fluidic 783	Description	Lid Thickness [µm]	Material	Surface Treatment	Price [€/chip] 1+	10+	100+
10000981	Plasma generation chip with two membranes	140	Topas	-	79.50	63.50	42.50
10000982	Plasma generation chip with two membranes	125	PS		79.50	63.50	42.50
10000983	Plasma generation chip with two membranes	140	Topas	hydrophilized	89.50	69.40	47.10
10000984	Plasma generation chip with two membranes	125	PS	hydrophilized	89.50	69.40	47.10

3.15.3 Plasma/serum generation chip for on-chip analysis

This chip contains our classic plasma generation membrane with large footprint. However, somewhat special, Fluidic 973 has been tailored for on-chip analysis with a pre- and post-membrane chamber enabling i.e. optical readouts. The chip is filled via its Luer interface, while a venting membrane prevents generated plasma from exiting the chip. Please note that generated plasma is retained in this chip, hence it is not suitable for off-chip downstream experiments.

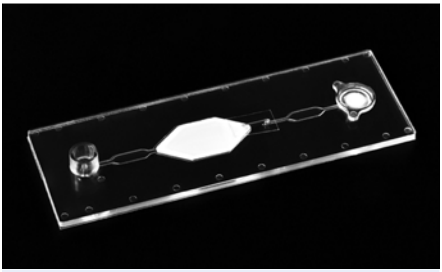


Fig. 314: On-chip analysis plasma generation chip Fluidic 973

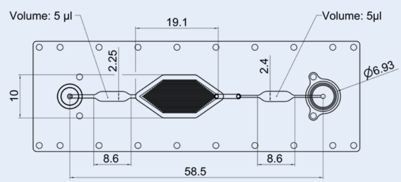


Fig. 315: Detailed schematic drawing of on-chip analysis plasma generation chip Fluidic 973

Product Code for Fluidic 973	Description	Lid Thickness [µm]	Material	Surface Treatment	Price [€/chip] 1+	10+	100+
10001338	On-chip analysis plasma generation chip	140	Topas	-	69.20	44.40	39.80

3.15.4 Open membrane chip

The open chips have been designed to allow direct access to membrane areas and provide a permanent entry port for liquid supply, storage and exchange. In combination with *microfluidic ChipShop*'s matching Interaction Tanks like Fluidic 234 and 235 for liquid supply and storage this chip allows for a wide variety of filtering and assay tasks.

Interaction tank Fluidic 235 is equipped with a cap that includes Mini Luer fluidic interfaces to be easily connected to pumps for permanent operation. For more information on our tanks please refer to the accessories chapter.

Fig. 316: Transwell membrane chip Fluidic 219

Fig. 317: Transwell membrane chip Fluidic 219 with tank Fluidic 234 as fluid reservoir

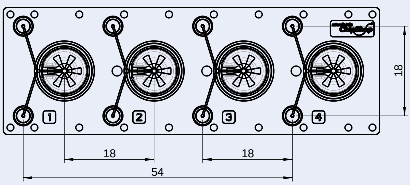


Fig. 318: Detail of transwell membrane chip Fluidic 219

Fig. 319: Transwell membrane chip Fluidic 219 with tank Fluidic 235 as fluid reservoir

Product Code for Fluidic 219	Description	Material	Surface Treatment	Price [€/chip] 1+	10+	100+
10001069	Open membrane chip Fluidic 219, 8 μm pore size membrane	Topas	-	79.50	63.50	42.50
10001070	Open membrane chip Fluidic 219, 8 μm pore size membrane	PS	-	79.50	63.50	42.50
10001071	Open membrane chip Fluidic 219, 8 μm pore size membrane	Topas	hydrophilized	89.50	69.40	47.10
10001072	Open membrane chip Fluidic 219, 8 μm pore size membrane	PS	hydrophilized	89.50	69.40	47.10

3.16 Cell and organism culture chips

The introduction of microfluidic settings in cell and organism culture experiments shall aid mimicking physiological conditions *in vitro*. The complexity of microfluidic cell cultures can thereby vary greatly. For simpler culture setting, in which cells reside within one culture chamber, many of our chamber chips, like Fluidic 584 or 585 are suitable options.

The chips presented in the following have been developed to meet more complex cell culture requirements. Our cross-flow membrane chips allow for the co-culture of various cell types within two separate culture compartments, divided by a permeable membrane.

With the interaction chip family cell-cell-interaction, of cells cultured in separate culture compartments, can be monitored.

Surface treatment: For adherend cell culture we recommend the use of hydrophilized chips to aid cell attachment to the culture surface. Furthermore, like any standard cell culture vessels, microfluidic chips can optionally be coated with extracellular matrix proteins to satisfy cell-specific attachment needs.

On-chip sensing: We are able to provide you with tailored sensing options (e.g. O_2 or CO_2 or pH sensing) for your microfluidic chip. Please check our Fiber sensor integration chips in chapter 4.

3.16.1 Cross-flow membrane chips

The cross-flow membrane chips have two in- and outlet ports above and below the membrane. Cell culture is just one potential application area of those versatile chips. The design also allows for experiments such as small molecule transfer measurements, on-chip dialysis and many more. Cross-flow membrane chips are available with different membranes, featuring distinct pore sizes. Upon request, the platforms can also be equipped with customer-specific membranes. Please contact us for feasibility and pricing.

Below an overview of critical culture vessel characteristics for our cross-flow membrane chips are given. These will help to set up defined experimental key criteria like cell seeding densities or alike.

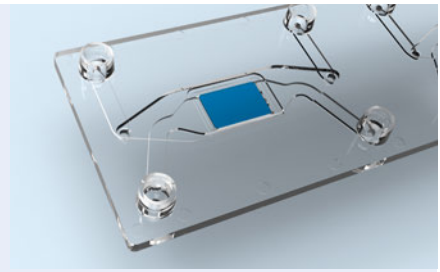


Fig. 320: Interaction area of a cross-flow membrane chip for cell culture applications

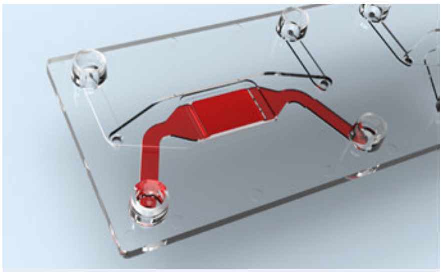


Fig. 321: Bottom chamber of cross-flow membrane chip Fluidic 480

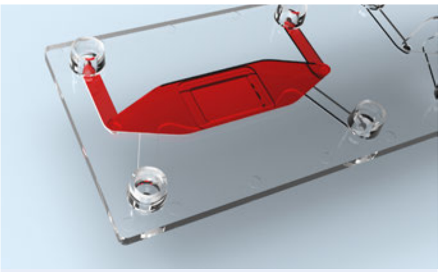


Fig. 322: Upper chamber of cross-flow membrane chip Fluidic 480

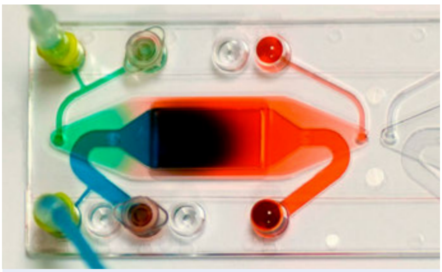


Fig. 323: Cross-Flow membrane chip Fluidic 653 perfused with coloured liquid

Fluidic Design	Interface Type	Available membrane pore sizes [µm]	Interaction area [mm²]	Upper chamber Volume [µl]	Upper chamber Total Surface [mm²]	Upper chamber Ground Surface [mm²]	Bottom chamber Volume [µl]	Bottom chamber Total Surface [mm²]	Bottom chamber Ground Surface [mm²]
480	Mini Luer	0.2; 0.4; 3; 8	36.0	87.5	440.0	154.0	61.5	271.0	118.0
568	Mini Luer + Luer	8	40.6	105.8	605.0	151.0	64.0	281.0	120.0
653	Mini Luer	0.4; 3; 8	71.5	145.0	595.0	223.5	101.8	419.0	185.0
694	Mini Luer	3; 8	71.5	137.8	573.5	220.0	79.5	340.7	140.0
747	Mini Luer	0.4; 8	71.5	281.4	1138.0	456.0	101.8	419.0	185.0
846	Mini Luer	8	395.5	500.0	1795.5	803.0	402.8	1818.7	674.7

Choosing the right membrane for your experiment

At *microfluidic ChipShop* we offer a variety of membranes within our cross-flow membrane chips. All of them are particularly suited for cell culture experiments, as the membrane surface is treated for tissue cultures to aid cell adhesion. However, membranes can vary greatly in their properties and should be selected according to desired experiment. Properties of membranes include:

- Pore size: pore size defines the membranes' potential to filter or retain cells or particles. The ability of cells to migrate through the membrane will also be influenced by membrane pore size.
- Pore density: together with pore size and pore orientation, the pore density ultimately defines the membrane permeability. The higher the pore density, the better the permeability will be.
- Light transmittance: membranes vary in their ability to transmit light. Translucent membranes are inadequate for cell microscopy due to their limited light transmission. In contrast, transparent membranes allow efficient light transmission, rendering them well-suited for optical and microscopy applications.
- Pore orientation: membrane pores can be oriented perpendicular (90° parallel) within the membrane or come in multiangles. Oftentimes, perpendicular pores come with a lower pore density and a higher light transmission rate.
- Membrane thickness: the thickness of the membrane can for example influence cell-cell interaction accross the membrane.

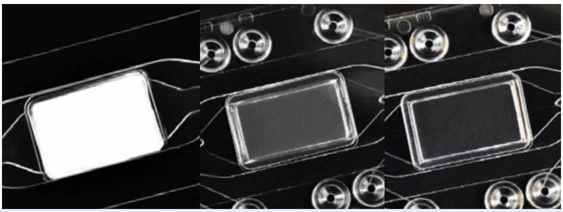


Fig. 324: Comparison of a white (left), translucent (middle) versus a transparent membrane (right) in dry conditions

Membrane type	mcs-membrane 076	mcs-membrane 156	mcs-membrane 132	mcs-membrane 073	mcs-membrane 155	mcs-membrane 120
Pore size [µm]	0.2	0.2	0.4	3	3	8
Cell culture	✓	✓	✓	✓	✓	✓
Color	white	transparent	transparent	translucent	transparent	transparent
Imaging	✗	✓	✓	✗	✓	✓
Pore density [/cm²]	$5x10^8$	10^7	$4x10^6$	$3x10^6$	$8x10^5$	10^5
Pore orientation	mulitangles	90° parallel	90° parallel	mulitangles	90° parallel	90° parallel
Membrane thickness [µm]	23	12	12	23	12	11
Membrane material	PET	PET	PET	PET	PET	PET

Our cell culture chips are proven tools for your successful microfluidic cell culture experiment. Please refer to the following publications for application examples:

1. Maurer M., et al., A three-dimensional immunocompetent intestine-on-chip model as in vitro platform for functional and microbial interaction studies, *Biomaterials,* doi: 10.1016/j.biomaterials.2019.119396, 2019
2. Pein H., et al., Endogenous metabolites of vitamin E limit inflammation by targeting 5-lipoxygenase, *Nat Commun.,*9(1):3834. doi: 10.1038/s41467-018-06158-5, 2018
3. Raasch M., et al., An integrative microfluidically supported in vitro model of an endothelial barrier combined with cortical spheroids simulates effects of neuroinflammation in neocortex development, *Biomicrofluidics,*10(4):044102. doi: 10.1063/1.4955184, 2016
4. Rennert K., et al., A microfluidically perfused three dimensional human liver model, *Biomaterials,* 119-131, doi: 10.1016/j.biomaterials.2015.08.043, 2015

The cross-flow membrane chip Fluidic 480 with Mini Luer interfaces is the simplest chip within the cross-flow membrane chip family. It possesses two functional culturing units on one chip. Fluidic 480 is available off-the-shelf with many different membranes and is the perfect tool to trial membrane types.

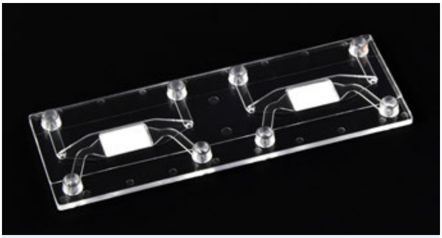


Fig. 325: Cross-flow membrane chip Fluidic 480

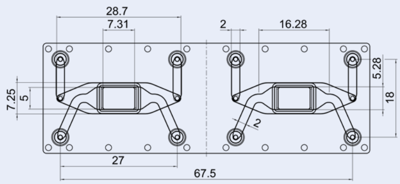


Fig. 326: Schematic drawing of Fluidic 480

Product Code for Fluidic 480	Description	mcs-membrane	Pore size [µm]	Lid Thickness [µm]	Material	Surface Treatment	Price [€/chip] 1+	10+	100+
10000737	Cross-flow membrane chip	076	0.2	140	Topas	-	79.50	63.50	42.50
10000738	Cross-flow membrane chip	076	0.2	125	PS	-	79.50	63.50	42.50
10002098	Cross-flow membrane chip	156	0.2	140	Topas	-	79.50	63.50	42.50
10002099	Cross-flow membrane chip	156	0.2	125	PS	-	79.50	63.50	42.50
10001553	Cross-flow membrane chip	132	0.4	140	Topas	-	79.50	63.50	42.50
10001554	Cross-flow membrane chip	132	0.4	125	PS	-	79.50	63.50	42.50
10002102	Cross-flow membrane chip	073	3	140	Topas	-	79.50	63.50	42.50
10002103	Cross-flow membrane chip	073	3	125	PS	-	79.50	63.50	42.50
10002083	Cross-flow membrane chip	155	3	140	Topas	-	79.50	63.50	42.50
10002084	Cross-flow membrane chip	155	3	125	PS	-	79.50	63.50	42.50
10000284	Cross-flow membrane chip	120	8	140	Topas	-	79.50	63.50	42.50
10000496	Cross-flow membrane chip	120	8	125	PS	-	79.50	63.50	42.50
10000739	Cross-flow membrane chip	076	0.2	140	Topas	hydrophilized	89.50	69.40	47.10
10000770	Cross-flow membrane chip	076	0.2	125	PS	hydrophilized	89.50	69.40	47.10
10002100	Cross-flow membrane chip	156	0.2	140	Topas	hydrophilized	89.50	69.40	47.10
10002101	Cross-flow membrane chip	156	0.2	125	PS	hydrophilized	89.50	69.40	47.10
10001555	Cross-flow membrane chip	132	0.4	140	Topas	hydrophilized	89.50	69.40	47.10
10001556	Cross-flow membrane chip	132	0.4	125	PS	hydrophilized	89.50	69.40	47.10
10002104	Cross-flow membrane chip	073	3	140	Topas	hydrophilized	89.50	69.40	47.10
10002105	Cross-flow membrane chip	073	3	125	PS	hydrophilized	89.50	69.40	47.10
10002085	Cross-flow membrane chip	155	3	140	Topas	hydrophilized	89.50	69.40	47.10
10002086	Cross-flow membrane chip	155	3	125	PS	hydrophilized	89.50	69.40	47.10
10000497	Cross-flow membrane chip	120	8	140	Topas	hydrophilized	89.50	69.40	47.10
10000498	Cross-flow membrane chip	120	8	125	PS	hydrophilized	89.50	69.40	47.10

The cross-flow membrane chip Fluidic 568 with Luer and Mini Luer interfaces gives the option to connect a fluidic reservoir to the Luer interface.
For instance, the special Pipette-Chip-Bridge can be used to combine sample uptake with a standard pipette and sample release via Luer interfaces of the chip. The Pipette-Chip-Bridge can be found in the accessories chapter.

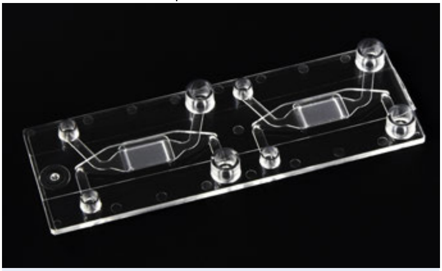


Fig. 327: Cross-flow membrane chip Fluidic 568

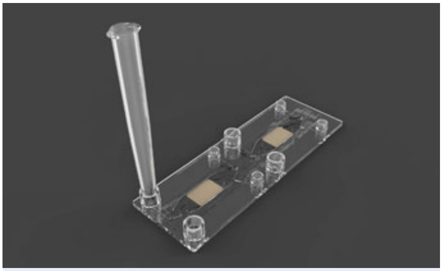


Fig. 328: Pipette-Chip-Bridge (Fluidic 569) mounted on Luer interface of the cross-flow membrane chip Fluidic 568

Product Code for Fluidic 568	Description	mcs-membrane	Pore size [µm]	Lid Thickness [µm]	Material	Surface Treatment	Price [€/chip] 1+	10+	100+
10001200	Cross-flow membrane chip	120	8	140	Topas	-	79.50	63.50	42.50
10001202	Cross-flow membrane chip	120	8	125	PS	-	79.50	63.50	42.50
10001201	Cross-flow membrane chip	120	8	140	Topas	hydrophilized	89.50	69.40	47.10
10001203	Cross-flow membrane chip	120	8	125	PS	hydrophilized	89.50	69.40	47.10

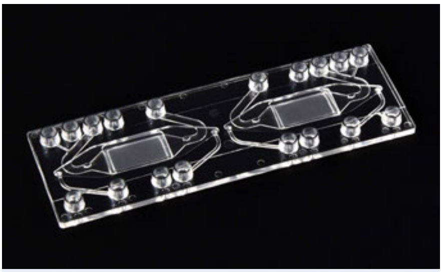


Fig. 329: Cross-Flow membrane chip Fluidic 653 with additional in- and outlet channels

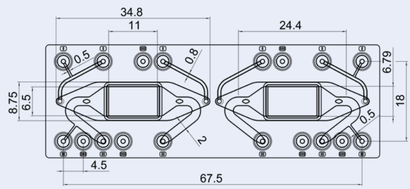


Fig. 330: Schematic drawing of Cross-Flow membrane chip Fluidic 653 with additional in- and outlet channels

Product Code for Fluidic 653	Description	mcs-membrane	Pore size [µm]	Lid Thickness [µm]	Material	Surface Treatment	Price [€/chip] 1+	10+	100+
10000920	Cross-flow membrane chip	120	8	140	Topas	-	79.50	63.50	42.50
10000799	Cross-flow membrane chip	120	8	125	PS	-	79.50	63.50	42.50
10000921	Cross-flow membrane chip	073	3	140	Topas	-	79.50	63.50	42.50
10000790	Cross-flow membrane chip	073	3	125	PS	-	79.50	63.50	42.50
10001565	Cross-flow membrane chip	132	0.4	125	PS	-	79.50	63.50	42.50
10000922	Cross-flow membrane chip	120	8	140	Topas	hydrophil.	89.50	69.40	47.10
10000917	Cross-flow membrane chip	120	8	125	PS	hydrophil.	89.50	69.40	47.10
10000923	Cross-flow membrane chip	073	3	140	Topas	hydrophil.	89.50	69.40	47.10
10000918	Cross-flow membrane chip	073	3	125	PS	hydrophil.	89.50	69.40	47.10
10001566	Cross-flow membrane chip	132	0.4	125	PS	hydrophil.	89.50	69.40	47.10

The cross-flow membrane chip Fluidic 653 can be ordered as open sytem for self-assemly. The chips come without cover lid on the upper chamber, to enable access to the membrane from the top. For sealing, the chips are equiped with a medical grade double-sided adhesive gasket. Removing the protective liner (white) of the adhesive will enable to close the chips with a cover lid of choice.
For this task, pre-cut foil in slide formate are available. You can find them in chapter 9 Polymer substrates and foils.

Fig. 331: Example of a Cross-Flow membrane chip with open top and double-sided adhesive tape gasket (white)

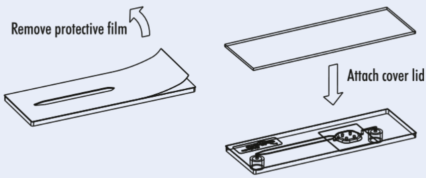


Fig. 332: Principle setup of the open chips with double-sided adhesive gasket

Product Code for Fluidic 653	Description	mcs-membrane	Pore size [µm]	Lid Thickness [µm]	Material	Surface Treatment	Price [€/chip] 1+	10+	100+
10001420	Cross-flow membrane chip, open top for membrane access	120	8	140	Topas	-	103.30	87.30	64.30
10001421	Cross-flow membrane chip, open top for membrane access	120	8	125	PS	-	103.30	87.30	64.30
10000924	Cross-flow membrane chip, open top for membrane access	120	8	140	Topas	hydrophil.	106.30	89.30	66.00
10000832	Cross-flow membrane chip, open top for membrane access	120	8	125	PS	hydrophil.	106.30	89.30	66.00

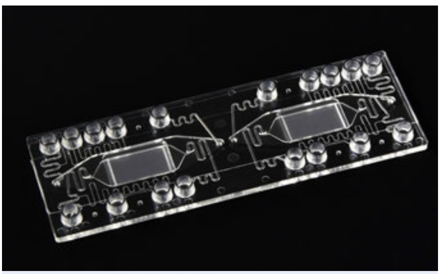


Fig. 333: Cross-Flow membrane chip Fluidic 694 with additional in- and outlet channels

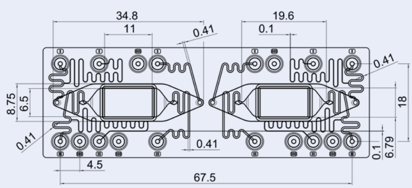


Fig. 334: Schematic drawing of Cross-Flow membrane chip Fluidic 694 with additional in- and outlet channels

Product Code for Fluidic 694	Description	mcs-membrane	Pore size [µm]	Lid Thickness [µm]	Material	Surface Treatment	Price [€/chip] 1+	10+	100+
10002040	Cross-flow membrane chip	120	8	140	Topas	-	79.50	63.50	42.50
10000911	Cross-flow membrane chip	120	8	125	PS	-	79.50	63.50	42.50
10002042	Cross-flow membrane chip	073	3	140	Topas	-	79.50	63.50	42.50
10000915	Cross-flow membrane chip	073	3	125	PS	-	79.50	63.50	42.50
10002041	Cross-flow membrane chip	120	8	140	Topas	hydrophil.	89.50	69.40	47.10
10000912	Cross-flow membrane chip	120	8	125	PS	hydrophil.	89.50	69.40	47.10
10002043	Cross-flow membrane chip	073	3	140	Topas	hydrophil.	89.50	69.40	47.10
10000916	Cross-flow membrane chip	073	3	125	PS	hydrophil.	89.50	69.40	47.10

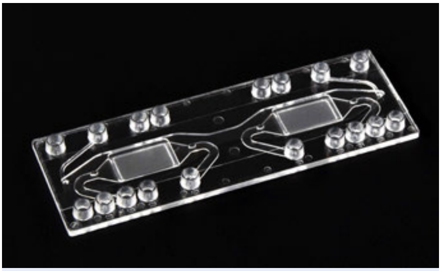


Fig. 335: Cross-flow membrane chip Fluidic 747

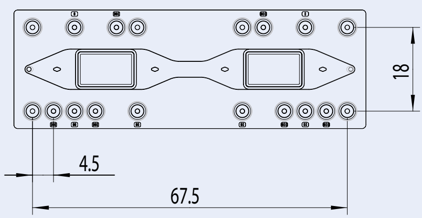


Fig. 336: Cross-flow membrane chip Fluidic 747 - upper chamber

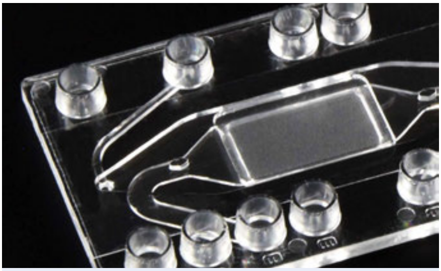


Fig. 337: Detail of the cross-flow membrane chip Fluidic 747

Product Code for Fluidic 747	Description	mcs-membrane	Pore size [µm]	Lid Thickness [µm]	Material	Surface Treatment	Price [€/chip] 1+	10+	100+
10001018	Cross-flow membrane chip	120	8	140	Topas	-	79.50	63.50	42.50
10001019	Cross-flow membrane chip	120	8	125	PS	-	79.50	63.50	42.50
10001557	Cross-flow membrane chip	132	0.4	140	Topas	-	79.50	63.50	42.50
10001558	Cross-flow membrane chip	132	0.4	125	PS	-	79.50	63.50	42.50
10001020	Cross-flow membrane chip	120	8	140	Topas	hydrophil.	89.50	69.40	47.10
10001021	Cross-flow membrane chip	120	8	125	PS	hydrophil.	89.50	69.40	47.10
10001559	Cross-flow membrane chip	132	0.4	140	Topas	hydrophil.	89.50	69.40	47.10
10001560	Cross-flow membrane chip	132	0.4	125	PS	hydrophil.	89.50	69.40	47.10

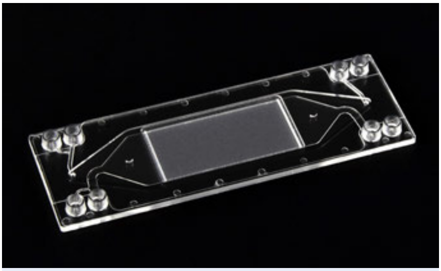


Fig. 338: Cross-flow membrane chip Fluidic 846

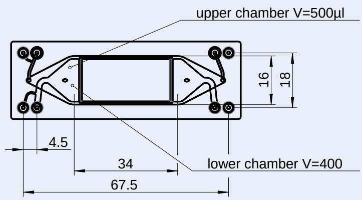


Fig. 339: Cross-flow membrane chip Fluidic 846 - Volumes

Product Code for Fluidic 846	Description	mcs-membrane	Pore size [µm]	Lid Thickness [µm]	Material	Surface Treatment	Price [€/chip] 1+	10+	100+
10001122	Cross-flow membrane chip	120	8	140	Topas	-	79.50	63.50	42.50
10001123	Cross-flow membrane chip	120	8	125	PS	-	79.50	63.50	42.50
10001121	Cross-flow membrane chip	120	8	140	Topas	hydrophil.	89.50	69.40	47.10
10001124	Cross-flow membrane chip	120	8	125	PS	hydrophil.	89.50	69.40	47.10

Cross-flow membrane chips as multi-organ platform

The micro-iPS profiler chip is a multi-organ platform featuring in total four interconnected cross-flow membrane chambers, to establish complex organoid models. Coming in standardized titer plate (Fluidic 923) or double slide format (Fluidic 1356) it ensures the compatibility with common laboratory equipment.
The largest chamber is used for the preparation of a liver culture, whilst the other three chamber are used to display different types of kidney cell types.The main microfluidic circuit in the upper part connects all four chambers, for continuous perfusion. A second circuit in the lower part is used for the liver chamber solely and a third in the lower part of the three kidney chambers.The renal chambers are used for automatic media exchange (usually every 24 hours). Each chamber has individual inlet and outlet ports for cell seeding.

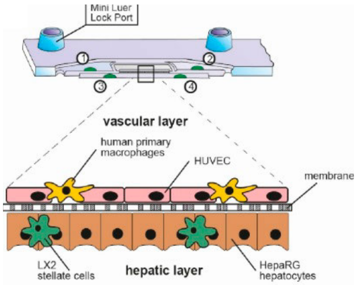


Fig.: 340: Liver culture in a cross-flow membrane chip, with vascular cell layer on top and hepatic cell layer below the porous membrane (from Rennert K., et al., Biomaterial, 2015)

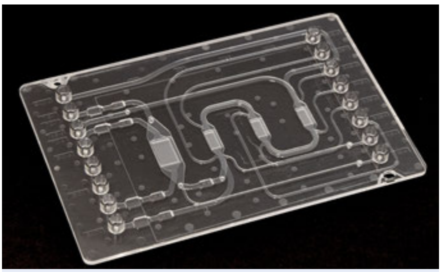


Fig. 341: Cross-flow membrane chip Fluidic 923 with Luer interfaces

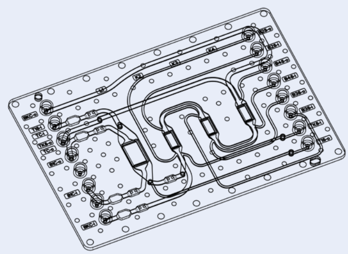


Fig. 342: Cross-flow membrane chip Fluidic 923

Chip Fluidic 1356 features additional detection chambers and ports, compatible with the PreSens sensor system, allowing for continuous monitoring of pH, CO_2 and O_2 in the fluidic circuits.
The ready-to-use SensorPlug consists of a Mini Luer interface, an optical fiber for read-out and a specific sensor at the tip of the fiber. The SensorPlug is mounted directly onto the microfluidic channel network, ensuring that the sensor gets into contact with the fluid pathway. Thereby, changes in the concentration can be monitored in real-time. For more information please see chapter 4.

Please note: The chips are only recommended for low-pressure applications, in order to avaoid leakage at the sensor ports. If you don't need the sensor ports we recommend to close them with our mini Luer plugs (10000054) or mini Luer caps (10001687) in TPE.

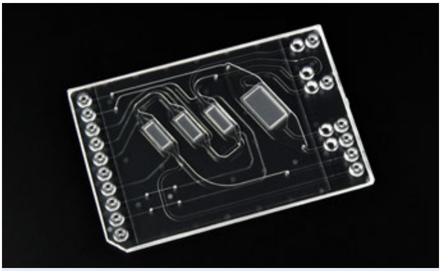


Fig. 343: Cross-flow membrane chip Fluidic 923 with Mini Luer interfaces and Sensor ports

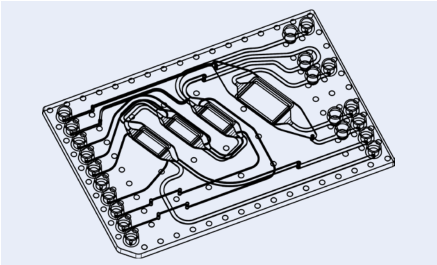


Fig. 344: Schematic drawing of the cross-flow membrane chip Fluidic 1356

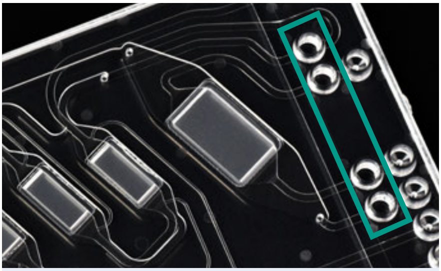


Fig. 345: Detail of the cross-flow membrane chip Fluidic 923 with Mini Luer interfaces and Sensor ports (marked in green)

Fig. 346: PreSens SensorPlugs mounted on adjacent micro-fluidic channels

Product Code	Fluidic	Interface type	mcs-membrane	Pore size [µm]	Lid Thickness [µm]	Material	Surface Treatment	Price [€/chip] 1+	10+	100+
10002050	923	Luer	120	8	188	Zeonor	-	156.25	110.65	80.85
10002051	923	Luer	120	8	188	Zeonor	hydrophilized	159.25	112.65	82.55
10002052	1356	Mini Luer	120	8	188	Zeonor	-	132.98	88.50	64.70
10002053	1356	Mini Luer	120	8	188	Zeonor	hydrophilized	135.98	90.50	66.40

3.16.2 Chamber chip with pre-heating channel

While cells ought to be cultured at 37°C, cell culture medium storage temperatures are generally lower. This is why this cell culture chamber chip features an additional extended channel upstream the cell culture area to ensure appropriate medium warm up prior to the cell culture. The chip features Mini Luer interfaces and is, like most of our cell culture chips, compatible with our Lab-on-a-Chip Cell Culture Incubator – LOC CCI 1.

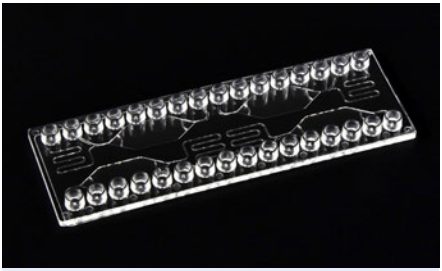


Fig. 347: Chamber chip with pre-heating channels Fluidic 992

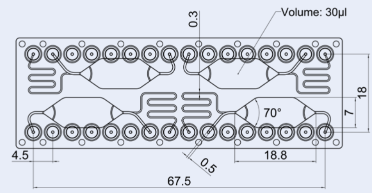


Fig. 348: Detailed schematic drawing of chamber chip with pre-heating channels Fluidic 992

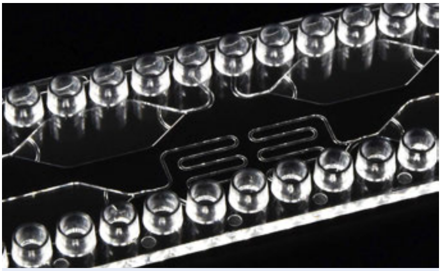


Fig. 349: Detail of the chamber chip with pre-heating channels Fluidic 992

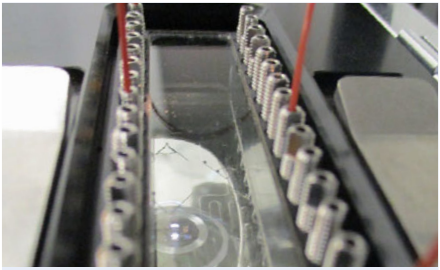


Fig. 350: Chamber chip with pre-heating channels operated using LOC CCI 1

Product Code for Fluidic 992	Chamber Volume [µl]	Chamber Ground Surface [mm²]	Lid Thickness [µm]	Material	Surface Treatment	Price [€/chip] 1+	Price [€/chip] 10+	Price [€/chip] 100+
10001339	30	100	140	Topas	-	36.20	24.30	16.10
10001341	30	100	125	PS	-	36.20	24.30	16.10
10001343	30	100	188	Zeonor	-	36.20	24.30	16.10
10001340	30	100	140	Topas	hydrophilized	39.20	26.30	17.80
10001342	30	100	125	PS	hydrophilized	39.20	26.30	17.80
10001344	30	100	188	Zeonor	hydrophilized	39.20	26.30	17.80

3.16.3 Cell trap chip

This chip family features 16 individual microfluidic channels with small wells on the bottom. The wells have been designed to trap individual cells and enable monitoring and imaging at a single cell level. **Please note:** Whilst the overall layout of Cell trap chip I (Fluidic 913) and Cell trap chip II (Fluidic 1022) is very similar, the chips feature different well geometries.

Fluidic 913 features multiple well gemometries per chip, that differ in depth, diameter and distance (pitch) to each other (see table below). The well-containing channels feature a width of 1500 μm and a height of 200 μm.
Fluidic 1022 has a uniform well geometrie with a width of 100 μm, a depth of 50 μm and a distance of 250 μm.The well-containing channels feature a width of 1500 μm and a height of 200 μm.

Well geometry of Fluidic 913				
Channel	Well width	Well depth	Pitch [μm]	Number of wells
1, 2	100	100	250	200
3, 4	100	75	250	200
5, 6	100	50	250	200
7, 8	75	75	250	200
9, 10	75	50	250	200
11, 12	50	50	200	319
13, 14	50	40	200	319
15, 16	100	75	250	200

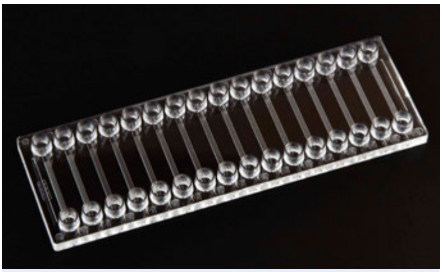


Fig. 351: Cell trap chip I & II

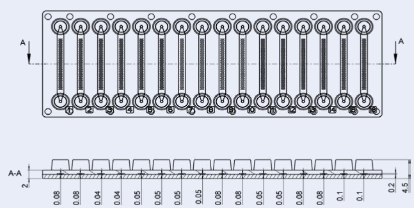


Fig. 352: Depth of wells on cell trap chip I Fluidic 913

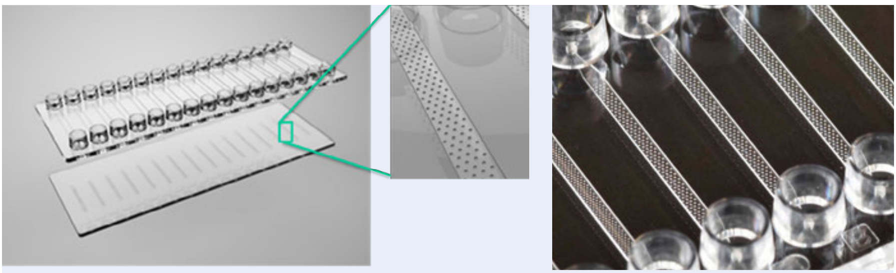


Fig. 353: Exploded view of the cell trap chip with 16 parallel cell trapping channels and Mini Luer interfaces (left) and cell trap channels in detail (middle and right)

Product Code	Description	Lid Thickness [μm]	Material	Fluidic	Price [€/chip] 1+	10+	100+
10001990	Cell trap chip I	1000	Zeonor	913	69.20	44.40	39.80
10002075	Cell trap chip II	1000	Zeonor	1022	69.20	44.40	39.80

3.16.4 Chamber interaction chips

The chamber interaction chips are a chip family allowing for the evaluation of the effect of migrating molecules from one compartment to another. Cell-cell-interaction can be nicely evaluated e.g. the metabolic response on different drug dosage. Various experimental settings can be implemented on these chips having different pathways and fluidic modules for molecules in the fluidic channel network.

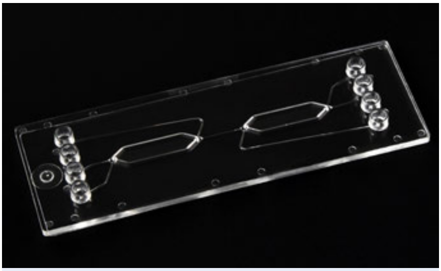


Fig. 354: Interaction chip Fluidic 688

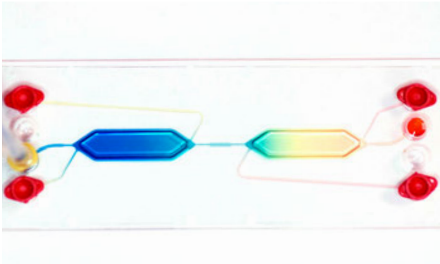


Fig. 355: Interaction chip Fluidic 688 filled with coloured liquids

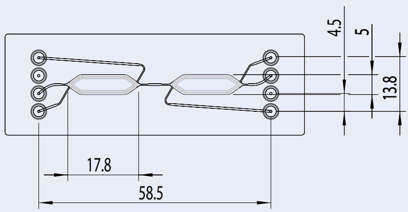


Fig. 356: Schematic drawing of chamber interaction chip Fluidic 688

Product Code for Fluidic 688	Chamber Volume [µl]	Chamber Depth [µm]	Lid Thickness [µm]	Material	Surface Treatment	Price [€/chip] 1+	10+	100+
10001055	37.8	400	140	Topas	-	36.20	24.30	16.10
10001056	37.8	400	125	PS	-	36.20	24.30	16.10
10001057	37.8	400	140	Topas	hydrophilized	39.20	26.30	17.80
10001058	37.8	400	125	PS	hydrophilized	39.20	26.30	17.80

Fig. 357: Interaction chip Fluidic 737

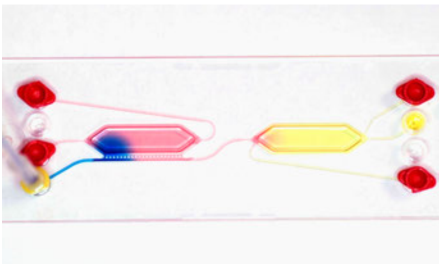


Fig. 358: Interaction chip Fluidic 737 filled with coloured liquids

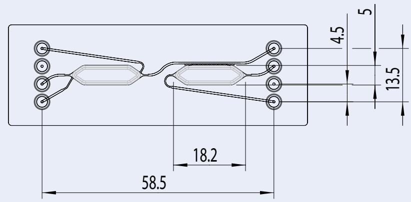


Fig. 359: Schematic drawing of the chip Fluidic 737

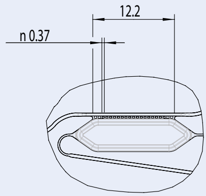


Fig. 360: Detail of contact zone Interaction chip Fluidic 737

Product Code for Fluidic 737	Chamber Volume [µl]	Chamber Depth [µm]	Lid Thickness [µm]	Material	Surface Treatment	Price [€/chip] 1+	10+	100+
10001059	53.1	600	140	Topas	-	36.20	24.30	16.10
10001061	53.1	600	125	PS	-	36.20	24.30	16.10
10001284	53.1	600	188	Zeonor	-	36.20	24.30	16.10
10001060	53.1	600	140	Topas	hydrophilized	39.20	26.30	17.80
10001062	53.1	600	125	PS	hydrophilized	39.20	26.30	17.80
30001001	53.1	600	188	Zeonor	hydrophilized	39.20	26.30	17.80

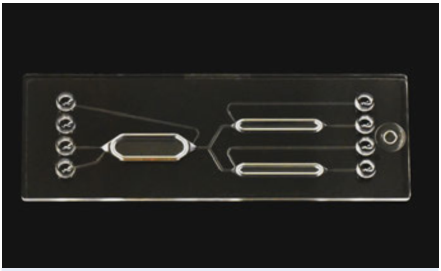


Fig. 361: Interaction chip Fluidic 782

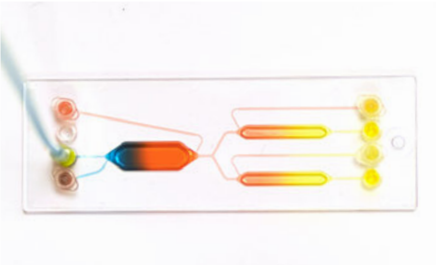


Fig. 362: Interaction chip Fluidic 782 filled with coloured liquids

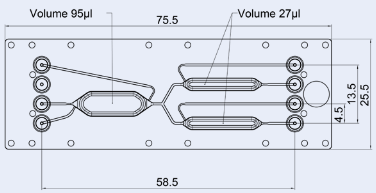


Fig. 363: Schematic drawing of chamber interaction chip Fluidic 782

Product Code for Fluidic 782	Chamber Volume [µl]	Chamber Depth [µm]	Lid Thickness [µm]	Material	Surface Treatment	Price [€/chip] 1+	10+	100+
10002048	95; 27	1100; 430	125	PS	-	36.20	24.30	16.10
10002049	95; 27	1100; 430	125	PS	hydrophilized	39.20	26.30	17.80

3.16.5 Channel interaction chip

The channel interaction chip has been developed to study cells co-cultured in three adjacent channels, to each of which a microfluidic flow can be applied. The three channels are divided from each other by transmissive pillar barriers. On each channel interaction chip five independent co-culture units can be found, which differ in the width of the pillar barrier. One potential co-culture setting is the use of the two outer channels in perfusion mode, while the inner channel can be easily filled with a cell-containing gelatinous extracellular matrix, for static 3D culture conditions. All channels feature a depth of 500 μm.

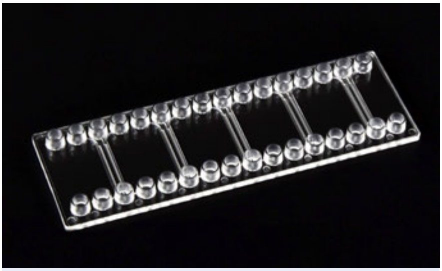


Fig. 364: Channel interaction chip Fluidic 983 with Mini Luer interfaces

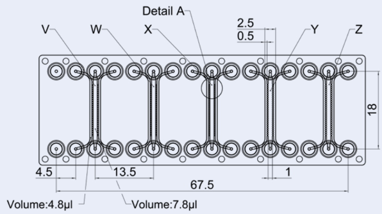
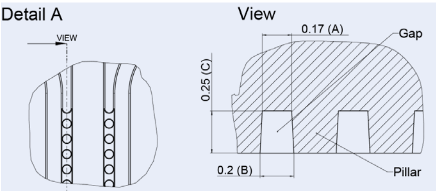


Fig. 365: Channel interaction chip Fluidic 983



	V	W	X	Y	Z
A	0.225	0.19	0.17	0.1	0.08
B	0.25	0.225	0.2	0.175	0.15
C	0.15	0.2	0.25	0.5	0.5

Fig. 366: Channel interaction chip Fluidic 983

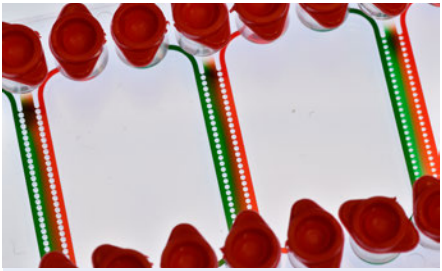


Fig. 367: Channel interaction chip Fluidic 983 filled with coloured liquids

Product Code for Fluidic 983	Description	Lid Thickness [μm]	Material	Surface Treatment	Price [€/chip]		
					1+	10+	100+
10001345	Channel interaction chip	140	Topas	-	36.20	24.30	16.10
10001347	Channel interaction chip	125	PS	-	36.20	24.30	16.10
10001349	Channel interaction chip	188	Zeonor	-	36.20	24.30	16.10
10001346	Channel interaction chip	140	Topas	hydrophilized	39.20	26.30	17.80
10001348	Channel interaction chip	125	PS	hydrophilized	39.20	26.30	17.80
10001350	Channel interaction chip	188	Zeonor	hydrophilized	39.20	26.30	17.80

3.16.6 Scaffold and 3D culture integration chip

Scaffold-based 3D culture integration in microfluidic chips provides a versatile platform for creating physiologically relevant in vitro models of tissues and organs. This technology allows to closely mimic the natural microenvironment of cells, enabling better insights into tissue biology, disease mechanisms, and drug responses.

The scaffold and 3D culture integration chip Fluidic 1380 has 5 replicate functional units per chip and comes with Mini Luer interfaces. Each unit features a central compartment for sample integration, along with multiple inlet and outlet channels. This central compartment not only accommodates the incorporation of a scaffold (supplied by the customer) but also allows for the integration of complex structures like hydrogels and tissues. The inlet channels facilitate processes such as cell seeding, subsequent perfusion, and the introduction of various drugs into the sample.

The chip is designed as an open platform, allowing straightforward access to the central compartment for convenient sample integration. Additionally, each chip includes a pressure-sensitive adhesive tape that ensures easy sealing by the customer. Once the experiment is complete, the tape can be peeled off, enabling the retrieval of the sample for further downstream processing.

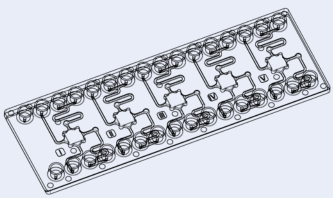


Fig. 368: Schematic drawing of scaffold and 3D culture integration chip Fluidic 1380

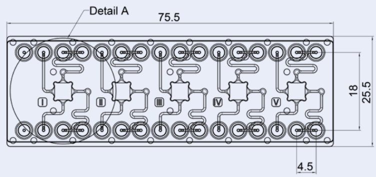


Fig. 369: Detail of scaffold and 3D culture integration chip Fluidic 1380

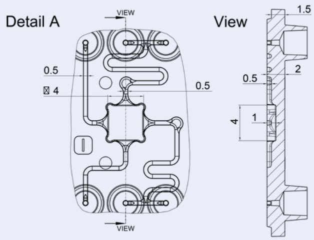


Fig. 370: Dimensions of the central compartment on Fluidic 1380 for the integration of complex structures

Product Code for Fluidic 1380	Description	Material	Price [€/chip] 1+	10+	100+
10002122	Scaffold and 3D culture integration chip with pressure sensitive adhesive tape	Topas	51.50	41.50	32.50

3.16.7 Suspension cell culture chip

microfluidic ChipShop's suspension cell culture chips are ideal for long-term cell cultivation and perfusion of non-adherent cell types. The microfluidic chips have microscopy slide formate and come with a matching handling frame, that combines easy accessibility for fluid handling e.g. medium exchange, as well as routined read-out. The cultuivation chambers feature excellent optical quality for high-resolution microscopy with every inverted microscope.
The matching metal handling frame can hold up to four suspension cell chips secured in place by its magnetic locking mechanism. It comes in the size of a conventional microtiter plate, making it compatible with every microscope and plate reader having a holder for multiwell plates. Therefore, high-throughput cell imaging on motorized stages is made feasible.

The suspsension cell chip **Fluidic 1471** has 16 replicate cultivation chambers and is designed for **passive pumping**. The patented passive pumping technology from is based on hydrostatic pressure as well as capillary forces, and combines both ingeniously to allow for extremly smooth pump-free liquid handling.
Passive pumping relies on the automated movement of liquid from the inlet to the outlet. Liquid can be easily applied with a mulitpipette or a pipetting robot on the defined landing zone /through holes) and is slowly and absolutely pulsation free moved in laminar fashion over the cultivation chamber, allowing for a smooth medium exchange prior entering the waste area (reservoir on chip). The chip is thus not only perfectly suited for suspension cell cultures, with a risk of flushing the cells out of the cavity in perfused mode, but also for cells that are sensitive to shear stress. Various applications have been implemented carrying out multi-colour staining tasks for different assays.

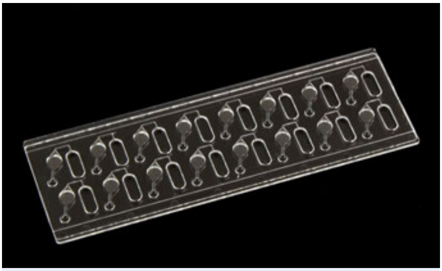


Fig. 371: Suspension cell chip Fluidic 1471

Fig. 372: Suspension cell chip Fluidic 1471 inside of the handling frame

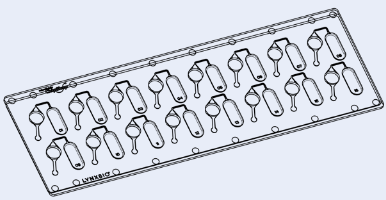


Fig. 373: Schematic drawing of the suspension cell chip Fluidic 1471

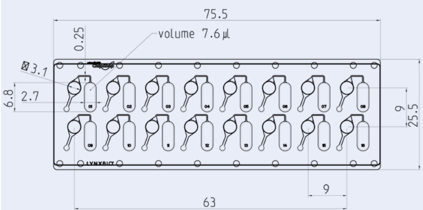


Fig. 374: Detailed schematic drawing of the suspension cell chip Fluidic 1471

Fig. 375: Detail of the suspension cell chip Fluidic 1471 with inlet (through hole), circular cell cultivation chamber and downstream waste reservoir (oval chamber)

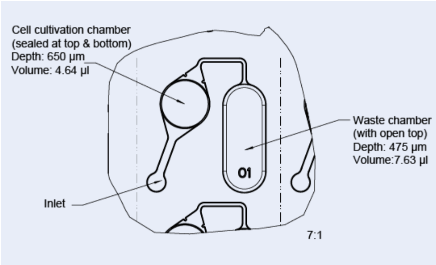


Fig. 376: Detail of one functional unit of the suspension cell chip Fluidic 1471

Product Code for Fluidic 1471	Description	Lid Thickness [µm]	Material	Surface Treatment	Price [€] pack of 10 chips
10001934	Suspension cell chip for passive pumping	500	Topas	Hydrophili-zation	428.30

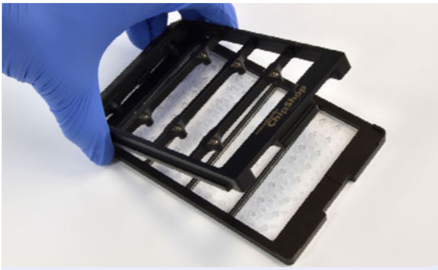


Fig. 377: Suspension cell chip Fluidic 1471

Fig. 378: Suspension cell chip Fluidic 1471 inside of the handling frame

Product Code	Description	Price [€/piece]
10002058	Handling frame for Fluidic 1471	645.00

3.16.8 Spheroid chip

The spheroid chip Fluidic 1407 is used for the insertion and separation of pre-cultivated spheroids or for the formation and cultivation of spheroidal cell structures and their imaging on-chip. The goblet-shaped catcher structures are arranged along a meandering, band-like main channel. Each catcher structure is followed by a small passage channel through which a suction effect is generated during fluidic operation. Consequently, spheroids are drawn into the catcher structures.
The design is offered as a test chip and features two varying structres with different dimensions for both, the catchers and passage channels, and it comes in single or double loops. A total of 12 structures are available on the chip, and each input side of a single structure features a bubble catcher trap.

Please note: In order to inhibit adhesion of cells to the chip surface we recommend to add PVA to the culture medium.

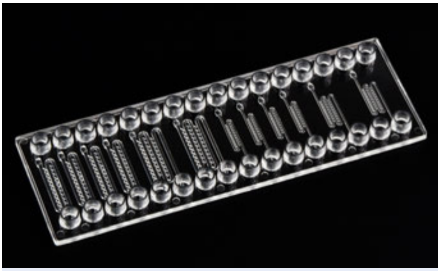


Fig. 379: Spheroid chip Fluidic 1407 with Mini Luer interface

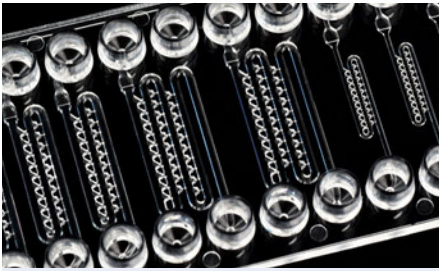


Fig. 380: Detail of spheroid chip Fluidic 1407

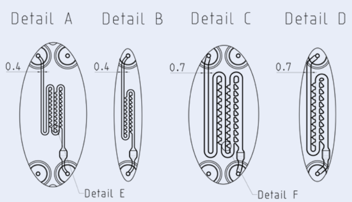


Fig. 381: Schematic drawing of the four different units

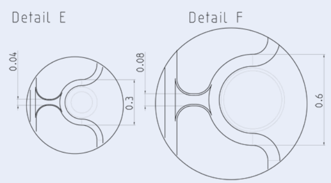


Fig. 382: Detail of spheroid catcher stuctures

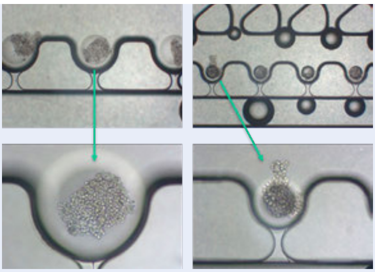


Fig. 383: Brightfield microscopy of formed spheroids in small & large catcher structures on chip

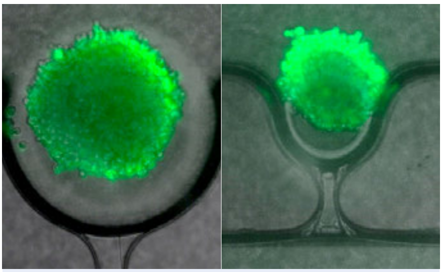


Fig. 384: Calcein AM staining of formed spheroids after 4d cultivation on chip in large (left) & small structures (right), FITC, 20x

Product Code for Fluidic 1407	Description	Lid Thickness [µm]	Material	Price [€/chip] 1+	10+	100+
10002013	Spheroidchip	140	Topas	42.20	34.30	26.10
10002045	Spheroidchip	125	PS	42.20	34.30	26.10

3.16.9 Organism-on-a-chip

Not only single cells but also multicellular cultures and entire organisms can be cultured on-chip.

3.16.9.1 Organism-on-a-chip - Zebrafish

The zebrafish chip is able to catch individual zebrafish eggs at pre-defined monitoring positions. The ctacher structures are arranged along a long meandering channel. Once catched the eggs will block the outlet of each catcher structres and the resulting suction effect will keep them in place.
Under constant perfusion the development of zebrafishes can then be observed. The design of this chip is based on the publication by J. Akagi et al., Miniaturized Embryo Array for Automated Trapping, Immobilization and Microperfusion of Zebrafish Embryos, PLoS One, 2012.

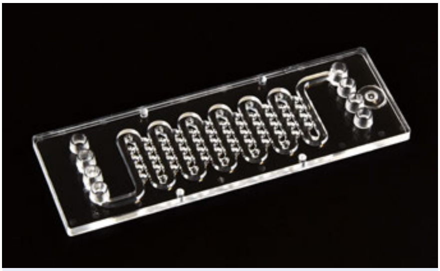


Fig. 385: Zebrafish chip Fluidic 1371

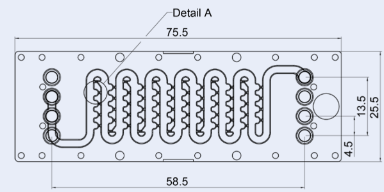


Fig. 386: Detailed overview of zebrafish chip Fluidic 1371 with inlets on the left and outlets on the right side

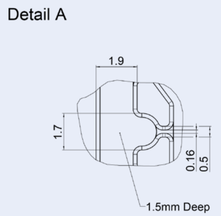


Fig. 387: Detail of the zebrafish chip with its trapping structures for single eggs

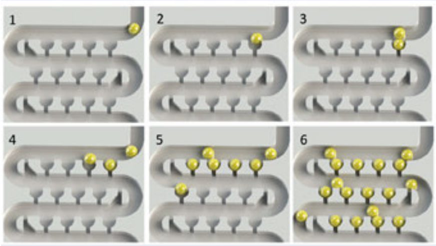


Fig. 388: Simulation how Zebrafish eggs are singulated by suction effect of the passage channels in the cup-shaped trap structures

Product Code for Fluidic 1371	Description	Lid Thickness [µm]	Material	Surface Treatment	Price [€/chip] 1+	10+	100+
10001774	Zebrafish chip	125	PS	-	42.20	34.30	26.10
10001775	Zebrafish chip	140	Topas	-	42.20	34.30	26.10

3.16.9.2 Organism-on-a-chip - *C.elegans*

The *C. elegans* chip is optimal for capture and release of multiple nematodes within one culture unit. Each chip features five culturing units, each possessing 20 capturing channels. The device can be used for long term monitoring studies and is based on the publication by SK Gokce et al., A multi-trap microfluidic chip enabling longitudinal studies of nerve regeneration in Caenorhabditis elegans, Sci Rep, 7(1):9837, 2017.

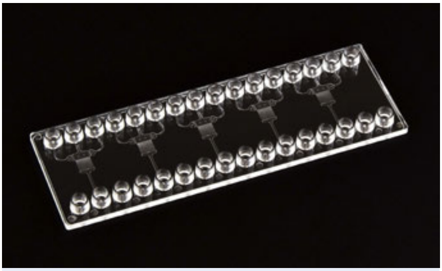


Fig. 389: C.elegans chip Fluidic 1417

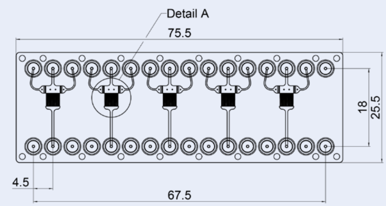


Fig. 390: Detailed overview of C. elegans chip Fluidic 1417

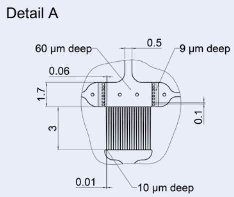


Fig. 391: Detail of the C. elegans chip with its trapping channels for 20 individual nematodes

Product Code for Fluidic 1417	Description	Lid Thickness [µm]	Material	Surface Treatment	Price [€/chip] 1+	10+	100+
10001858	C. elegans chip	125	PS	-	42.20	34.30	26.10
10001859	C. elegans chip	140	Topas	-	42.20	34.30	26.10

3.17 Barrier chips

This family of chips contains functional structures dedicated to retaining larger particles in the microfluidic channel/channel.

3.17.1 Barrier chips – Weir-filter chip

The chip contains four channels with weir structures for retaining particles (e.g. beads, cells etc.) of different sizes.

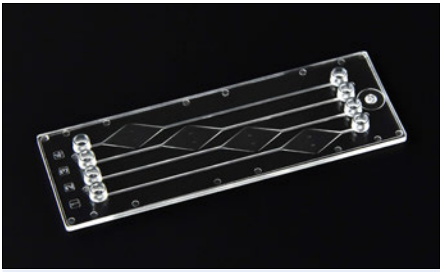


Fig. 392: Weir chip Fluidic 220

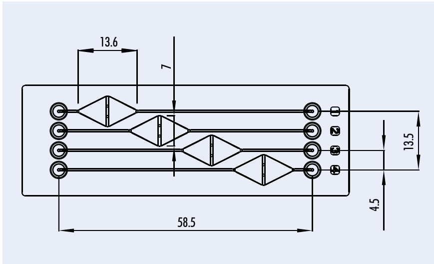


Fig. 393: Detail of weir chip Fluidic 220

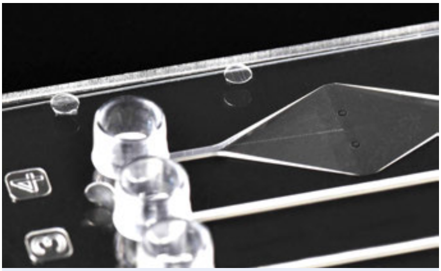


Fig. 394: Detail of the chamberf of weir chip Fluidic 220

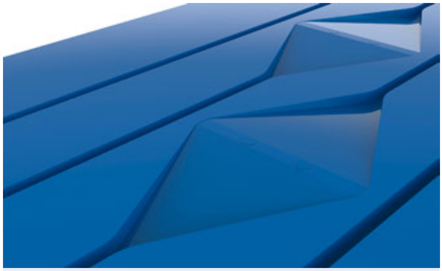


Fig. 395: Detail of ramped weir unit

Product Code for Fluidic 220	Slit width /height [mm]	[µm]	Lid Thickness [µm]	Channel Depth [µm]	Channel Width [µm]	Material	Surface Treat-ment	Price [€/chip] 1+	10+	100+
10000092	7	20 / 10 / 10 / 5	175	500	500	PC	-	42.20	34.30	26.10
10000093	7	20 / 10 / 10 / 5	188	500	500	Zeonor	-	42.20	34.30	26.10
10000499	7	20 / 10 / 10 / 5	140	500	500	Topas	-	42.20	34.30	26.10
10000502	7	20 / 10 / 10 / 5	175	500	500	PC	hydrophilized	45.20	36.30	27.80
10000501	7	20 / 10 / 10 / 5	188	500	500	Zeonor	hydrophilized	45.20	36.30	27.80
10000500	7	20 / 10 / 10 / 5	140	500	500	Topas	hydrophilized	45.20	36.30	27.80

3.17.2 Barrier chips – Barrier chamber chip

The barrier chamber chip Fluidic 1329 is the perfect tool to hold back small particles within an experimental chamber. It can therefore be used for chromatography-like experiments, for example. The barrier slit at the end of each chamber measures only 7 μm in height.

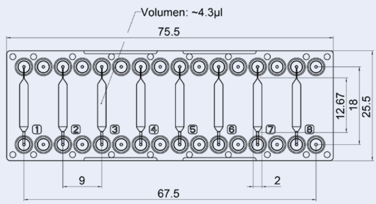


Fig. 396: Schematic drawing of Fluidic 1329 with Mini Luer interfaces

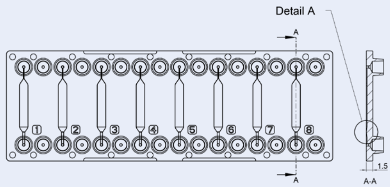


Fig. 397: Detail of the barrier chamber chip Fluidic 1329

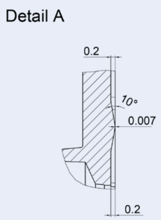


Fig. 398: Schematic drawing of Fluidic 1329 with Mini Luer interfaces

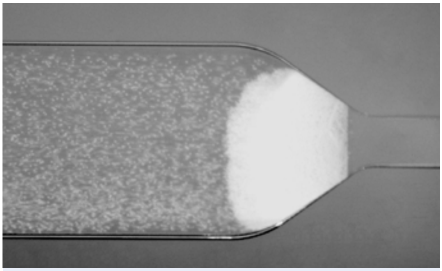


Fig. 399: Beads being held back and accumulated under flow within the barrier chamber

Product Code for Fluidic 1329	Description	Lid Thickness [μm]	Material	Surface Treatment	Price [€/chip]		
					1+	10+	100+
10001797	Barrier chamber chip	188	Zeonor	-	42.20	34.30	26.10
10002089	Barrier chamber chip	140	Topas	-	42.20	34.30	26.10
10001798	Barrier chamber chip	188	Zeonor	hydrophilized	45.20	36.30	27.80
10002090	Barrier chamber chip	140	Topas	hydrophilized	45.20	36.30	27.80

3.17.3 Barrier chips – Trapping chamber chip

The trapping chamber chip has been developed to introduce particularly large beads and particles through a dedicated opening into the monitoring/reaction chamber. The chamber features a height of 500 μm while the barriers with 40 μm height on either side, only allows smaller particles to pass. Various experimental settings can be facilitated with this kind of chip, as the sample inlets features not only a large diameter, but two of them come with a piercing structure, to rupture e.g., tin foil sealed tanks or alike. Luer interfaces with piercing structures are compatible with male Luer tanks such as Fluidic 823, 833, 933, 984 or 1548. The interfaces are not compatible with the male Luer connectors. For closing of interfaces, we recommend the use of plugs such as Fluidic 270, 262 or caps Fluidic 1231.

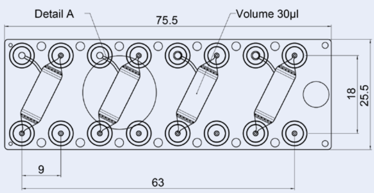


Fig. 400: Schematic drawing of Fluidic 1190 with four individual trapping chambers

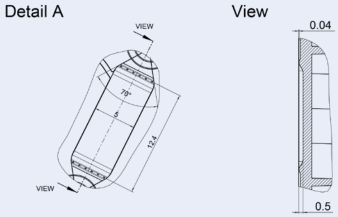


Fig. 401: Detailed drawing of an individual trapping chamber with 40 μm barriers at either end

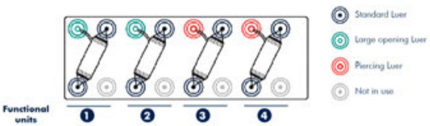


Fig. 402: Fluidic 1190 with Luer interfaces of different character

Fig. 403: Close-up of two trapping chambers of Fluidic 1190

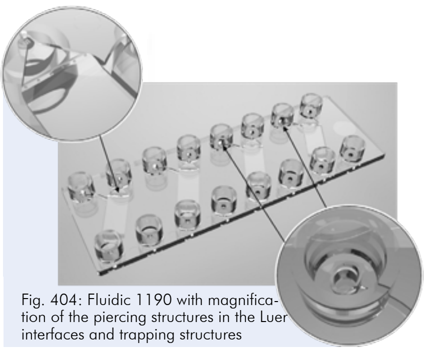


Fig. 404: Fluidic 1190 with magnification of the piercing structures in the Luer interfaces and trapping structures

Product Code for Fluidic 1190	Description	Lid Thickness [μm]	Material	Surface Treatment	Price [€/chip]		
					1+	10+	100+
10001630	Trapping chamber chip	140	Topas	-	42.20	34.30	26.10

3.18 Particle & cell sorting chips

Particle and cell sorting chips enable to separate cells, analyze them and optionally sort and collect the relevant cells. This can be done with basic set-ups on a microscope stage or with complete instruments. All chips of this family possess Mini Luer interfaces.

All the chips shown in this chapter can be visualized on a standard microscope. Preferably fluids are introduced with syringe pumps showing extremely low pulsation.

3.18.1 Particle sorting chips – Sheath flow

The particle sorting chips applying a sheath flow should be used with pulsation free syringe pumps. Velocity of the sheath flow should be significantly higher than the one of the sample stream and two streams entering through side-channels provide a sheath flow. The sorting can be done either by applying positive or negative pressure via the sampling channels at the end of the main channel. Five outlet channels with two junctions for sorting give the option to collect at two different locations target cells.

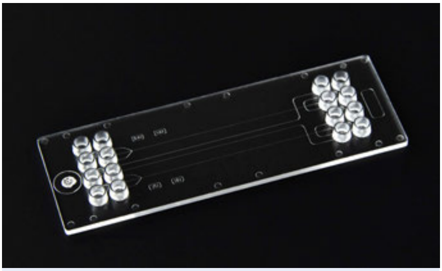


Fig. 405: Cell sorting chip Fluidic 283

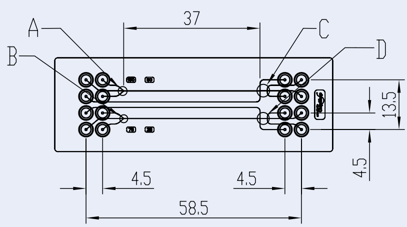


Fig. 406: Detail of cell sorting chip Fluidic 283

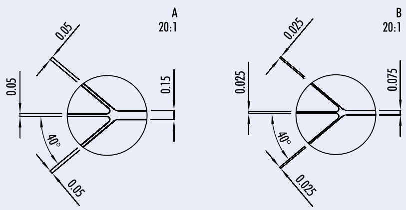


Fig. 407: Details of both entrance structures of cell sorting chip Fluidic 283

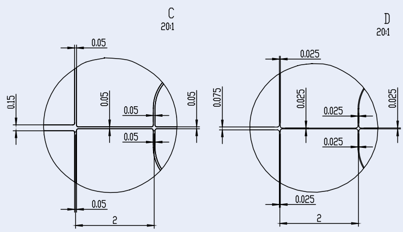


Fig. 408: Details of both outlet structures of cell sorting chip Fluidic 283

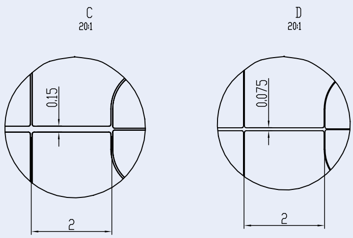


Fig. 409: Details of both outlet structures of cell sorting chip Fluidic 1102 – only difference to chip Fluidic 283

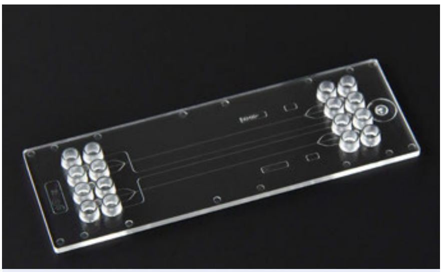


Fig. 410: Cell sorting chip Fluidic 381

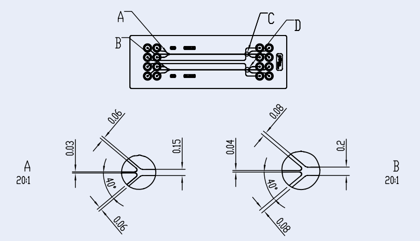


Fig. 411: Details of both inlet structures of cell sorting chip Fluidic 381

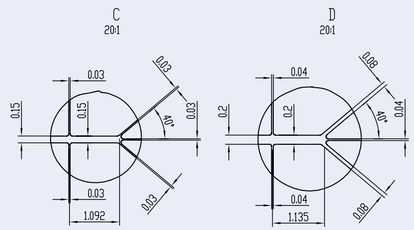


Fig. 412: Details of both outlet structures of cell sorting chip Fluidic 381 – only difference to chip Fluidic 283

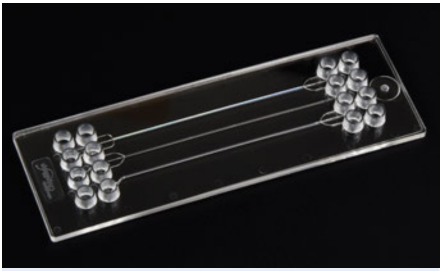


Fig. 413: Cell sorting chip Fluidic 1557

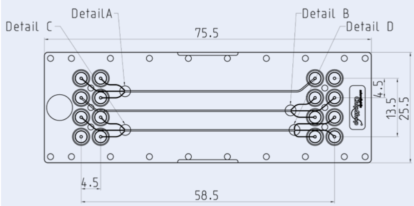


Fig. 414: Detail of cell sorting chip Fluidic 1557

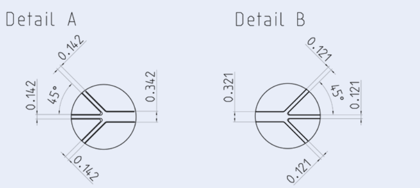


Fig. 415: Detailed structures of cell sorting chip Fluidic 1557

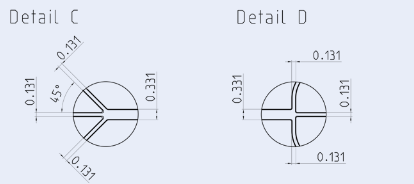


Fig. 416: Detailed structures of cell sorting chip Fluidic 1557

Product Code	Fluidic	Channel Depth Structure 1 [µm]	Structure 2 [µm]	Structure 3 [µm]	Lid Thickness [µm]	Material	Price [€/chip] 1+	10+	30+
10000123	283	50	25	-	175	PMMA	42.20	34.30	26.10
10000124	283	50	25	-	188	Zeonor	42.20	34.30	26.10
10001493	1102	50	25	-	175	PMMA	42.20	34.30	26.10
10001494	1102	50	25	-	100	Zeonor	42.20	34.30	26.10
10001823	381	30	30	-	175	PMMA	42.20	34.30	26.10
10000128	381	30	30	-	188	Zeonor	42.20	34.30	26.10
10001997	1557	400	200	300	140	Topas	42.20	34.30	26.10
10001998	1557	400	200	300	175	PC	42.20	34.30	26.10

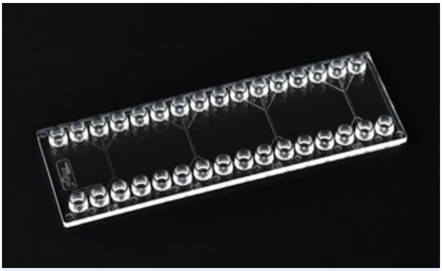


Fig. 417: Particle & cell sorter – Fluidic 386

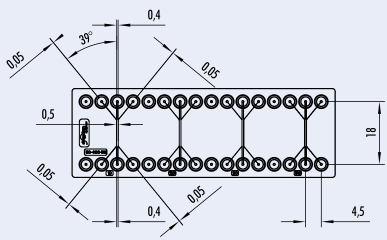


Fig. 418: Details particle & cell sorter – Fluidic 386

Product Code for Fluidic 386	Channel Depth Structure 1 [µm]	Structure 2 [µm]	Structure 3 [µm]	Structure 4 [µm]	Lid Thickness [µm]	Material	Price [€/chip] 1+	10+	30+
10001824	10	20	30	50	175	PMMA	42.20	34.30	26.10
10000158	10	20	30	50	188	Zeonor	42.20	34.30	26.10

3.18.2 Particle & cell sorting chips – Spiral sorter

Spirals can be used to separate particles according to their size due to the so-called Dean forces. Channel dimension, number of spirals and diameter of the curvature influence the sorting effect. The sample is introduced through a central inlet and fractions with particles of different size can be received at the different outlet ports.

The chip contains four sorting structures with the following parameters:

Structure	No. of turns	No. of outlets	Channel Width [µm]	Channel Depth [µm]
1	4	8	500	120
2	8	8	300	80
3	9	6	150	70
4	12	6	80	50

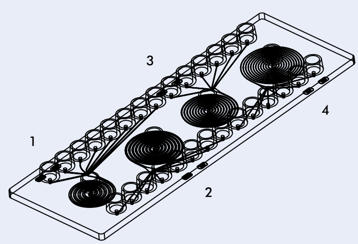


Fig. 419: Schematic drawing of the spirale sorter – Fluidic 382

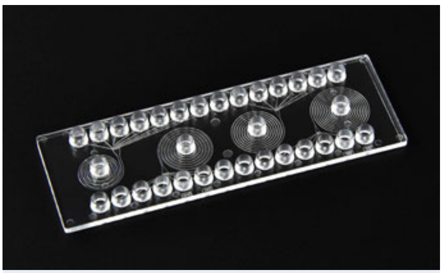


Fig. 420: Spiral sorter – Fluidic 382

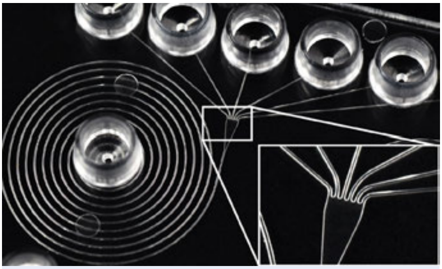


Fig. 421: Detail of sorting unit of Fluidic 382

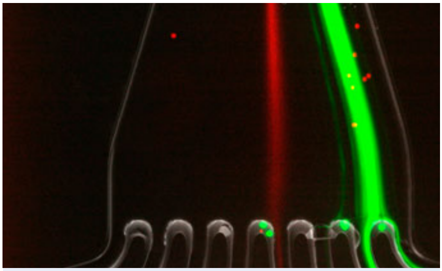


Fig. 422: Red (7 μm) and green (15 μm) fluorescent microbeads being sorted with sorting unit 2 of the spiral sorter chip

Product Code for Fluidic 382	Lid Thickness [μm]	Material	Price [€/chip]		
			1+	10+	100+
10001825	175	PMMA	42.20	34.30	26.10
10000160	188	Zeonor	42.20	34.30	26.10

3.19 Gradient chips

With the help of a branching channel network gradient chips enable the generation of concentration gradients and their use for various kinds of experiments on chip. At *microfluidic ChipShop* different gradient generation chips are available, differing for example in outlet channel design.

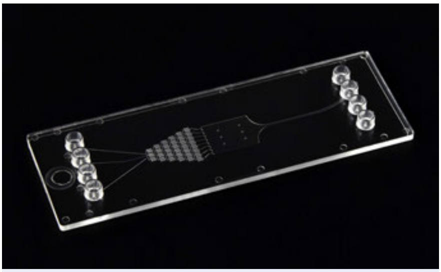


Fig. 423: Gradient generator Fluidic 834 with Mini Luer Interfaces

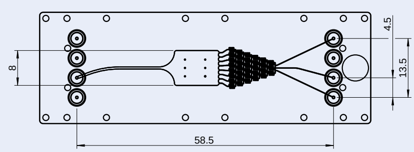


Fig. 424: Schematic drawing of gradient generator Fluidic 834

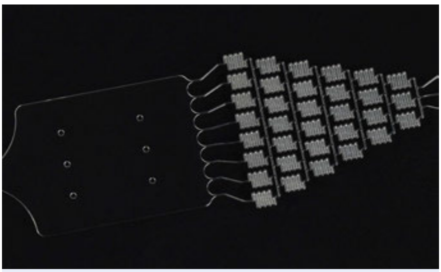


Fig. 425: Gradient chip Fluidic 834 with channel network and monitoring chamber

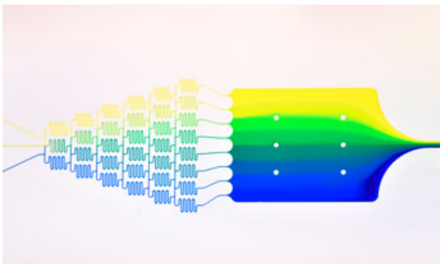


Fig. 426: Gradient chip Fluidic 834 to produce a color gradient

Product Code for Fluidic 834	Description	Lid Thickness [µm]	Material	Surface Treatment	Price [€/chip]		
					1+	10+	100+
10001063	Gradient generator	140	Topas	-	36.20	24.30	16.10
10001064	Gradient generator	125	PS	-	36.20	24.30	16.10
10001065	Gradient generator	140	Topas	hydrophilized	39.20	26.30	17.80
10001066	Gradient generator	125	PS	hydrophilized	39.20	26.30	17.80

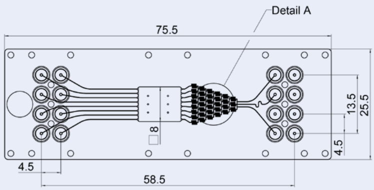


Fig. 427: Schematic drawing of gradient chip Fluidic 1287 with multiple outlet channels

Detail A

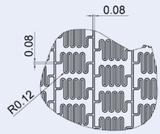


Fig. 428: Detail of meander channel network on Fluidic 1287

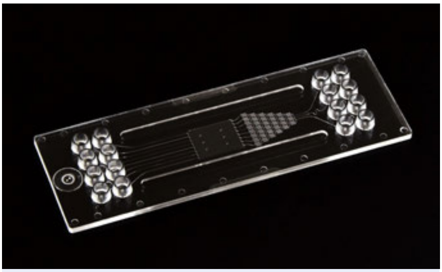


Fig. 429: Gradient chip Fluidic1287

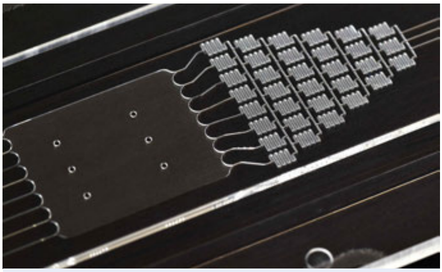


Fig. 430: Gradient chip Fluidic 1287 with channel network and monitoring chamber

Product Code Fluidic 1287	Description	Lid Thickness [µm]	Material	Surface Treatment	Price [€/chip]		
					1+	10+	100+
10001737	Gradient chip - multiple outlets	140	Topas	-	36.20	24.30	16.10
10001739	Gradient chip - multiple outlets	140	Topas	hydrophilized	39.20	26.30	17.80

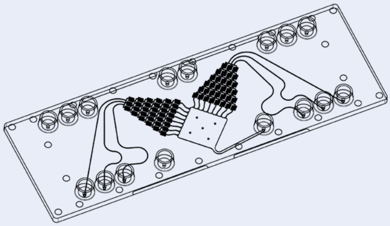


Fig. 431: Schematic drawing of 2D Gradient Generator Chip Fluidic 1166

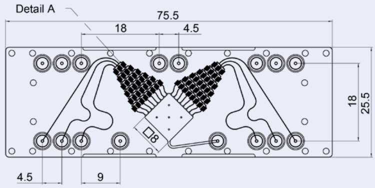


Fig. 432: Detailed schematic drawing of 2D Gradient Generator Fluidic 1166 with Mini Luer interfaces

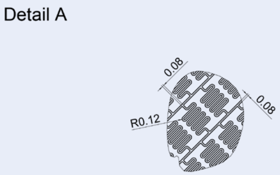


Fig. 433: The channels of Fludic 1166 are 80 μm wide

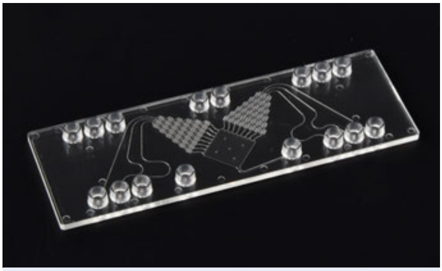


Fig. 434: Fluidic 1166 features three inlets on either side of the gradient chamber to perform highly complex experiments

Fig. 435: The 2D Gradient Generator chip can be used to generate various gradients, e.g. of drug concentrations or color

Product Code for Fluidic 1166	Description	Lid Thickness [μm]	Material	Surface Treatment	Price [€/chip]		
					1+	10+	100+
10001572	2D gradient generator	140	Topas	-	36.20	24.30	16.10
10001573	2D gradient generator	125	PS	-	36.20	24.30	16.10
10001574	2D gradient generator	140	Topas	hydrophilized	39.20	26.30	17.80
10001575	2D gradient generator	125	PS	hydrophilized	39.20	26.30	17.80

3.20 Pillar chip

The integration of pillars serves various needs. Such structures can be used to maintain particles at a certain area, to allow for self-filling of devices via capillary forces, to increase surface area, to have a sieving effect, or to use these structures for surface functionalization with high surface area regions in a microfluidic device.

In these pillar chips the pillars have a demolding angle of 10°. The table indicates the smallest diameter.

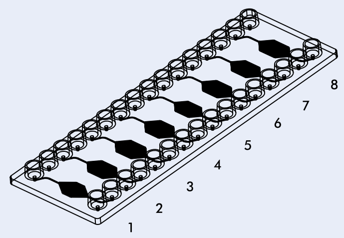


Fig. 436: Schematic drawing of pillar chip – Fluidic 261

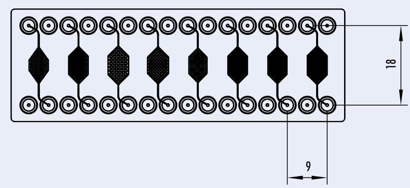


Fig. 437: Detail of pillar chip – Fluidic 261

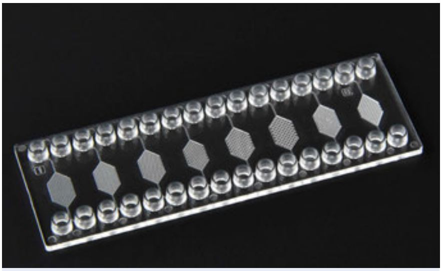


Fig. 438: Pillar chip – Fluidic 261

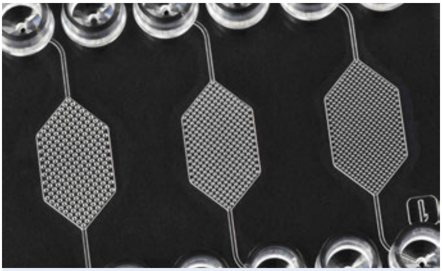


Fig. 439: Pillar chip filled – Fluidic 261

Product Code for Fluidic 261	Lid Thickness [µm]	Pillar No./diameter [µm]/ distance [µm]/depth	Material	Price [€/chip]		
				1+	10+	100+
10000100	175	1/100/350/150 2/150/400/150 3/200/500/200 4/250/600/200 5/300/700/250 6/350/800/250 7/150/500/300 8/150/500-700/300	PMMA	42.20	34.40	24.10
10000099	188	1/100/350/150 2/150/400/150 3/200/500/200 4/250/600/200 5/300/700/250 6/350/800/250 7/150/500/300 8/150/500-700/300	Zeonor	42.20	34.40	24.10

3.21 Field-flow fractionation chips

On the format of a microscopy slide (75.5 mm x 25.5 mm x 1.5 mm) with olives as fluidic interfaces, a field-flow fractionation structure is placed. The chips can be used for example for free-flow electrophoresis and free-flow magnetophoresis. The chips were developed within the BMBF-Project "Free-Flow-Chip", FKZ 01RI0643D.

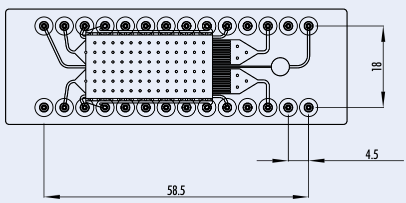


Fig. 440: Details of the field flow fractionation chip Fluidic 120

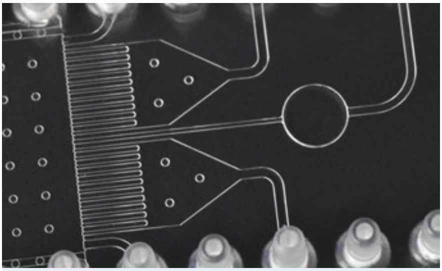


Fig. 441: detail of field flow fractionation chip Fluidic 120

Product Code for Fluidic 120	Lid Thickness [µm]	Material	Surface Treatment	Price [€/chip] 1+	10+	100+
10000333	175	PC	-	42.20	34.30	26.10
10000334	188	Zeonor	-	42.20	34.30	26.10
10000954	175	PC	hydrophilized	45.20	36.30	27.80
10000408	188	Zeonor	hydrophilized	45.20	36.30	27.80

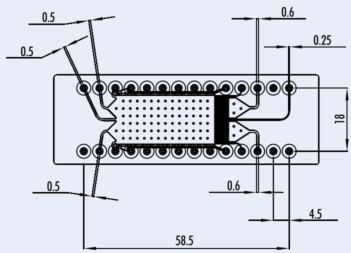


Fig. 442: Details of the field flow fractionation chip Fluidic 159

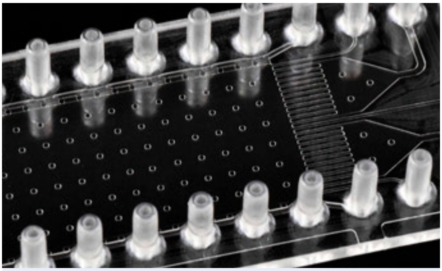


Fig. 443: Field flow fractionation chip Fluidic 159

Product Code for Fluidic 159	Lid Thickness [µm]	Material	Surface Treatment	Price [€/chip] 1+	10+	100+
10000270	175	PC	-	42.20	34.30	26.10
10000296	188	Zeonor	-	42.20	34.30	26.10
10000845	175	PC	hydrophilized	45.20	36.30	27.80
10000271	188	Zeonor	hydrophilized	45.20	36.30	27.80

3.22 On-chip valves

On chip valving gives the possibility to direct and dose fluids freely according to the respective needs. Simple membrane valves embedded in the fluidic design allow for an on-off functionality whereas rotary valves enable to channel fluids in different pathways or to dose liquids in loops on a chip or directly in the valve itself.

3.22.1 Rotary valve chip

Turning valves allow the targeted distribution of liquids and gases in channel networks, to actively open and close channels and to meter liquids. In instruments the valves are operated in an automated manner through turning the valve body in previously defined increments. For evaluation of metering on chip and in the valve body we offer a turning valve test chip. Turning valves can be operated either manually with a valve actuator, as shown below, or automatically with *microfluidic ChipShop's* ChipGenie® edition TV. Please see chapter 10.5 for the ChipGenie® edition TV.

Fig. 444: Turning valve test chip Fluidic 155

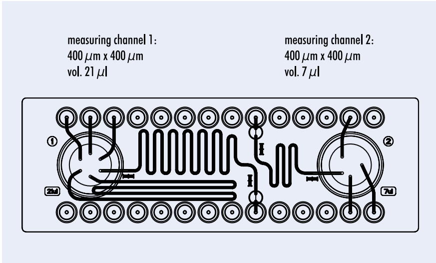


Fig. 445: Schematic drawing of the turning valve test chip

Fig. 446: Rotary valve with triangular recess for valve actuator

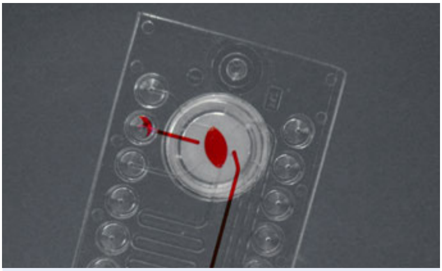


Fig. 447: Rotary valve from below with metering function

Product Code for Fluidic 155	Lid Thickness [µm]	Material	Price [€] 1+	10+
10000182	175	PC	128.50	79.60
10000183	188	Zeonor	128.50	79.60

Fig. 448: Manual turning valve actuator

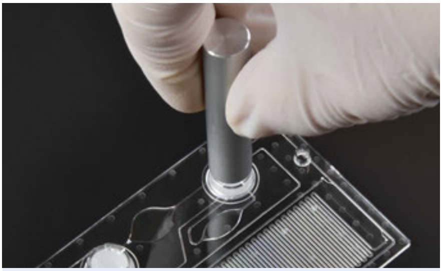


Fig. 449: Turning valve chip with manual valve actuator

Product Code	Description	Price [€]
10000742	Manual turning valve actuator	36.50

3.22.2 Membrane valve chip

The membrane valve chip Fluidic 1367 has 16 identical channels per chip and comes with olive interfaces. This enables direct contact, via tubing, to a pump system.
Each channel has an integrated membrane valve structure at the inlet, right below the olive interface, that can be controlled separately via a valve actuator. The membrane vlave is normally open and allows fluid to pass. Applying force from below, with a mechanical actuator, will lead to closure of the valve and hence stop the flow. The chip can be powered with liquids or gases and the valves remain tight up to a maximum inlet pressure of 3 bar.
Matching valve actuators are available from the company *memetis*. A plunger adapter for the valve geometry of Fluidic 1367 is available from *microfluidic ChipShop* on request. Reach out to inquiries@microfluidic-ChipShop.com and find out more about the possibility of the development of an instrument prototype serving your needs!

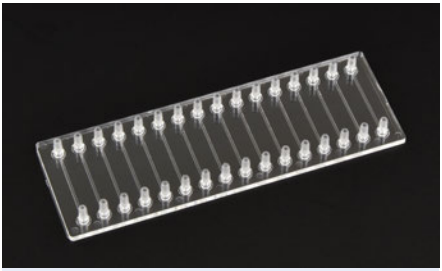


Fig. 450: Membrane valve chip Fluidic 1367 with olive interfaces

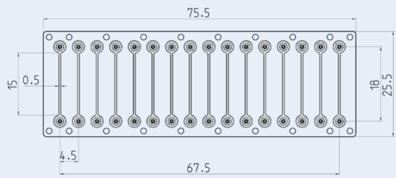


Fig. 451: Detail of the membrane valve chip Fluidic 1367

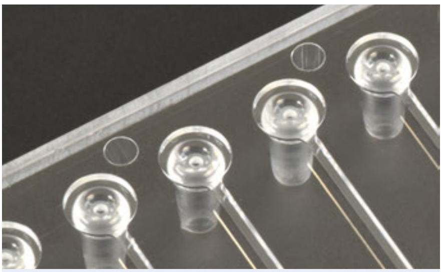


Fig. 452: Detail of the membrane valve chip Fluidic 1367 (image taken from below)

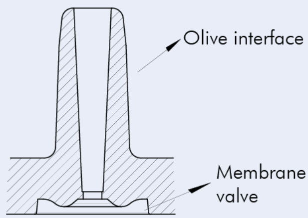


Fig. 453: Schematic drawing of an olive interface with membrane valve structure below

Product Code for Fluidic 1367	Description	Lid Thickness [µm]	Material	Price [€/chip] 1+	10+	30+
10002097	Membrane valve chip	100	Topas	42.20	34.40	26.10

3.23 Blister test chips

The blister test chips are intended to evaluate liquid storage in blister pouches on chip. All blister test chips feature the unique *microfluidic ChipShop* blister seat for uniform blister emptying. Each chip comes with mounted blisters of defined size and defined filling volume (dyed water). Customer-specific blister filling is available. Please contact us via *inquiries@microfluidic-ChipShop.com* for consultation and quotation.

Stand-alone standard blisters are filled with dyed water and are available in different volumes. Please see chapter 3.23.5 for the blister pouches and chapter 10.4 for the ChipGenie® edition BD.

3.23.1 Blister test chip

Being equipped with two blisters that can be operated individually, the blister test chip 289 allows to evaluate the flow rate of the blister emptying procedure and to compare two different channel settings.

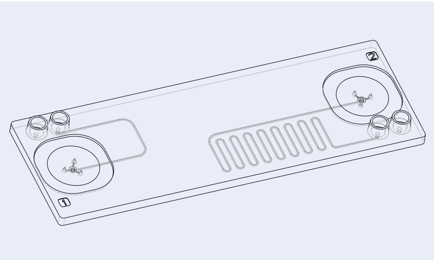


Fig. 454: Schematic drawing of blister test chip Fluidic 289. Blister position 1 being left and position 2 being right.

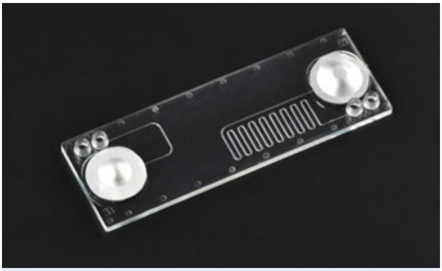


Fig. 455: Blister test chip Fluidic 289 with attached blister pouches

Product Code for Fluidic 289	Description	Blister details	Lid thickness [µm]	Surface treatment	Material	Price [€/chip] 1+	10+	100+
10001305	Blister test chip	Blister position 1: 50 µl; cyan; H_2O Blister position 2: 100 µl; magenta; H_2O	140	-	Topas	84.20	42.50	28.90
10001306	Blister test chip	Blister position 1: 50 µl; cyan; H_2O Blister position 2: 100 µl; magenta; H_2O	140	hydrophilized	Topas	87.20	45.50	31.90

3.23.2 Blister test chip – Emptying and volume evaluation

This blister test chip is equipped with two blisters followed by a straight channel or a channel with five cavities in line allowing for a measuring of 50 µl each.

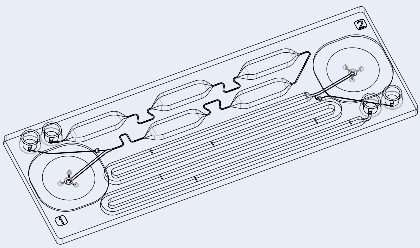


Fig. 456: Schematic drawing of blister test chip Fluidic 522. Blister position 1 being left and position 2 being right.

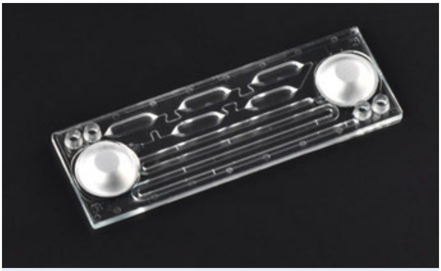


Fig. 457: Blister test chip Fluidic 522

Product Code for Fluidic 522	Description	Blister details	Lid thickness [µm]	Surface treatment	Material	Price [€/chip] 1+	10+	100+
10001307	Blister test chip - Emptying and volume evaluation	Blister position 1: 250 µl; cyan; H_2O Blister position 2: 250 µl; magenta; H_2O	140	-	Topas	84.20	42.50	28.90
10001308	Blister test chip - Emptying and volume evaluation	Blister position 1: 250 µl; cyan; H_2O Blister position 2: 250 µl; magenta; H_2O	140	hydrophilized	Topas	87.20	45.50	31.90

3.23.3 Blister test chip – Large volume blister

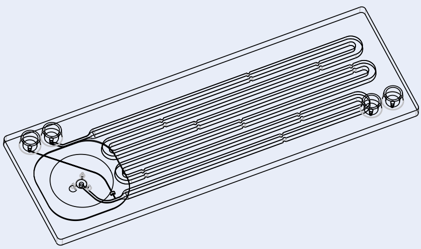


Fig. 458: Schematic drawing of blister test chip 761 – 500 µl blister

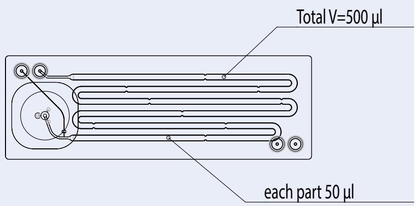


Fig. 459: Blister test chip fluidic 761 – 500 µl blister

Product Code for Fluidic 761	Description	Blister details	Lid thickness [µm]	Surface treatment	Material	Price [€/chip] 1+	10+	100+
10000979	Blister test chip - Large volume	Blister position 1: 500 µl; cyan; H_2O	140	-	Topas	64.80	34.60	22.15
10000980	Blister test chip - Large volume	Blister position 1: 500 µl; cyan; H_2O	140	hydrophilized	Topas	67.80	37.60	25.15

3.23.4 Blister test chip – Volume variation

This blister test chip is suitable for evaluating the emptying of a variety of blisters with volumes ranging from 50 µl to 500 µl. The chip design allows exact metering of 5 µl (for 50 µl blister), 15 µl (for 150 µl blister) and 25 µl (for 250 µl and 500 µl blisters) with the aid of downstream channel/chambers.

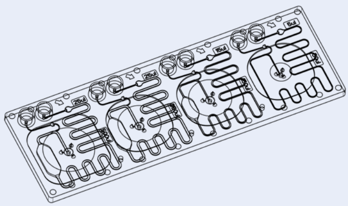


Fig. 460: Schematic drawing of blister test chip 1021

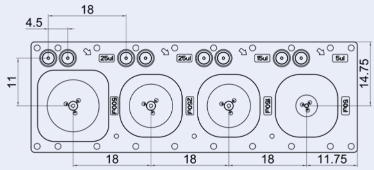


Fig. 461: Schematic drawing of blister test chip 1021 with metering system – view from top

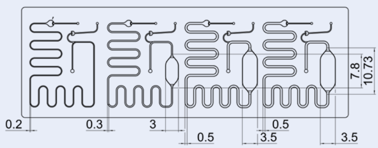


Fig. 462: Schematic drawing of blister test chip 1021 with metering system – view from bottom

Fig. 463: Blister test chip Fluidic 1021– volume variaton

Product Code for Fluidic 1021	Description	Blister details	Lid thick-ness [µm]	Surface treatment	Material	Price [€/chip] 1+	10+	100+
10001309	Blister test chip - Volume variation	Blister position 1: 500 µl; magenta; H_2O Blister position 2: 250 µl; cyan; H_2O Blister position 3: 150 µl; magenta; H_2O Blister position 4: 50 µl; cyan; H_2O	140	-	Topas	102.20	83.20	61.10
10001310	Blister test chip - Volume variation	Blister position 1: 500 µl; magenta; H_2O Blister position 2: 250 µl; cyan; H_2O Blister position 3: 150 µl; magenta; H_2O Blister position 4: 50 µl; cyan; H_2O	140	hydrophilized	Topas	105.20	86.20	64.10

3.23.5 Spare blisters

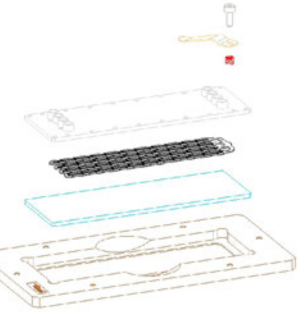
Blisters can be ordered as stand-alone parts being available with volumes ranging from 50 – 750 μl off-the-shelf.

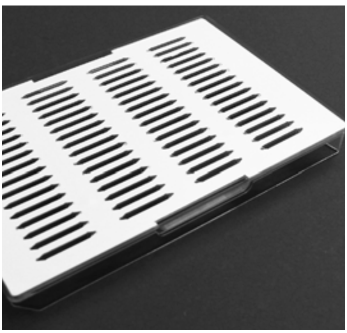
The blisters from 50 – 350 μl volume can be operated with microfluidic devices like blister test chips Fluidic 289 and Fluidic 522, the 500 μl blister requires Fluidic 761.

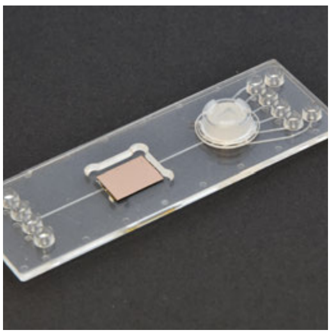
For convenience reasons, the blisters come with a ring of double sided adhesive tape to be mounted on the chips. Afterwards, the blisters can be removed for blister replacement.

All blisters can be ordered filled either with dye (cyan, magenta, yellow), water (clear) or user-specific liquids (to be provided to *microfluidic ChipShop*). Please inquire custom-fillings with *sales@microfluidic-ChipShop.com*.

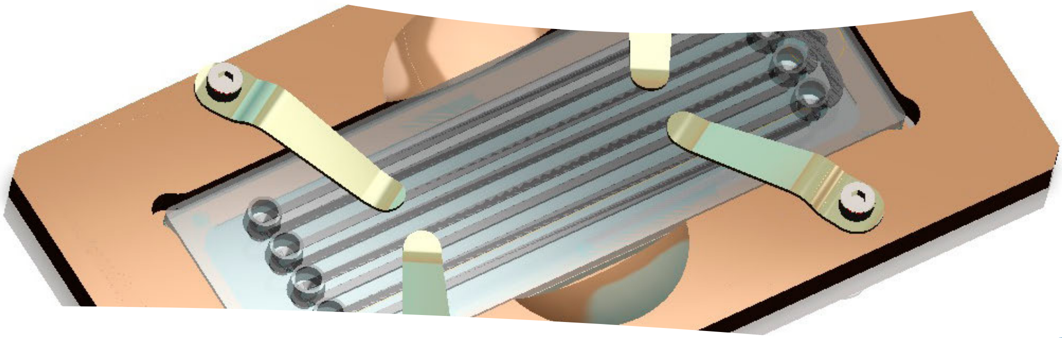
Product code (color-dependent)				Description	Blister Volume [μl]	Price [€/blister]		
Cyan	Magenta	Yellow	Clear			1+	10+	100+
10001605	10001606	10001607	10001608	Blister pouch	50	8.20	5.80	2.95
10001610	10001611	10001612	10001613	Blister pouch	100	8.20	5.80	2.95
10001615	10001616	10001617	10001618	Blister pouch	150	8.20	5.80	2.95
10001620	10001621	10001622	10001623	Blister pouch	200	8.20	5.80	2.95
10001597	10001537	10001538	10001625	Blister pouch	250	8.20	5.80	2.95
10001602	10001601	10001600	10001599	Blister pouch	350	8.20	5.80	2.95
10001603	10001626	10001627	10001628	Blister pouch	500	8.20	5.80	2.95
10001665	10001666	10001667	10001668	Blister pouch	750	8.20	5.80	2.95







4 Microfluidic devices for customization and sensor integration



Customize your chips – Tools for on-site assembly

For complex assay development, it becomes indispensible to tailor microfluidic devices to the precise assay specification. These chip modifications can involve not only the integration of further functionalities or the integration of special surface functions, but also the incorporation of appropriate sensor technology. This chapter highlights microfluidic tools and devices that are particullary suited for customization at the user's side.

4.1 Open chip platforms for self-assembly

For customized reagent and assay integration several chip types are at hand, having one or more integrated fluidic channels that remain open for manipulation at customer's side. A double-sided adhesive tape with approximately 140 µm thickness is mounted on the delivered chip with open channels. That means after processing just the protective foil needs to be removed and either a thin foil of the same material or e.g. a polymer/glas slide can be mounted on top. Please note that channel depth of the devices (stated in product tables) consist of the initial channel depth of the molded part plus the thickness of the adhesive tape.

microfluidic ChipShop offers several standard formats for open chip platforms. However, in general most of our off-the-shelf catalogue chips can be provided without a bonded cover lid, for you to connect the chip with a specific bottom that reflects your requirements.

As – somewhat generic – design rules, you should take the following aspects under consideration:

- Minimum channel width that can be cut into the double-sided adhesive tape: 200 µm
- Minimum radius of curvature of the structures cut in one line in the tape: 500 µm
- Minimum distance between two adjacent cut-out structures: 1 mm
- The remaining tape film should have as much mechanical stability as possible for mounting onto the molded substrate. This means, the shorter the cut-out sections and the more widely spaced, the better.

Please contact our sales team at *sales@microfluidic-ChipShop.com* for feasibility and pricing.

Spotting applications: Integration of protein or DNA arrays into chip modules for self-assembly can be nicely performed with the appropriate spotter (micro-dispensing) instrumentation. Please contact us for more information.

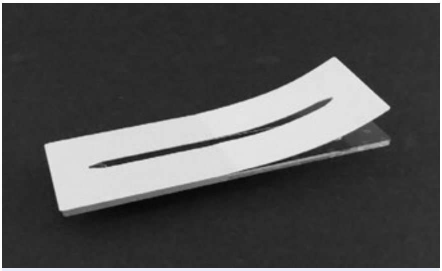


Fig. 464: Straight channel chip 268 with double-sided adhesive tape

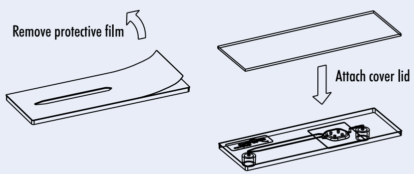


Fig. 465: Principle set-up of a chip with double-sided adhesive tape attached to the bottom of the chip

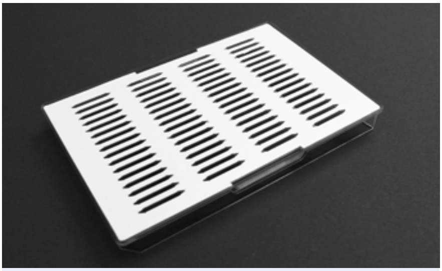


Fig. 466: Titer-plate sized microfluidic device for customization

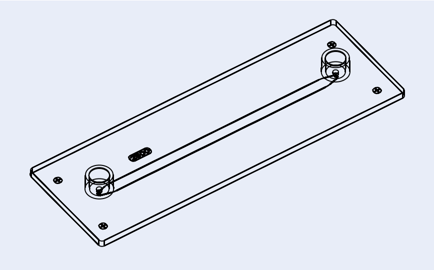


Fig. 467: Schematic drawing of chip Fluidic 268 with Luer interfaces to be equipped with double-sided adhesive tape

Fig. 468: Straight channel chip Fluidic 268 with double-sided adhesive tape

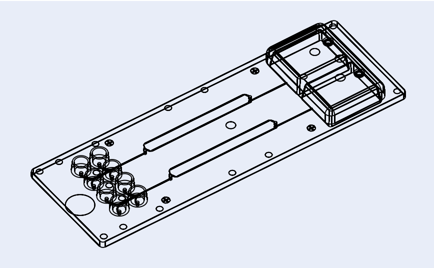


Fig. 469: Schematic drawing of chip Fluidic 272 with waste chamber to be equipped with double-sided adhesive tape

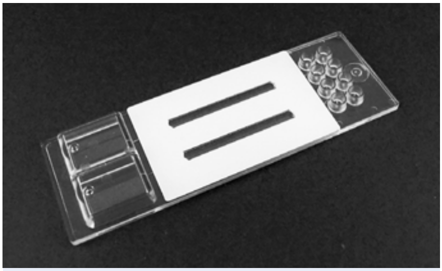


Fig. 470: Two channel chip 272 with double-sided adhesive tape

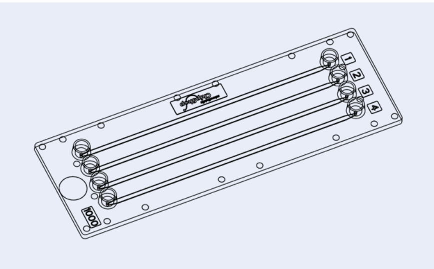


Fig. 471: Schematic drawing of chip Fluidic 138 to be equipped with double-sided adhesive tape

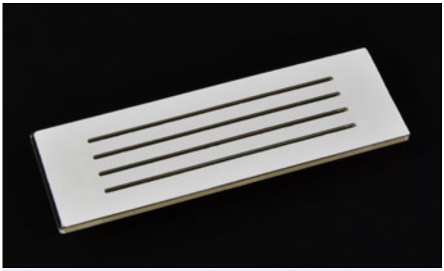


Fig. 472: Four channel chip Fluidic 138 with double-sided adhesive tape

Product Code	Description	Channel Width [µm]	Channel Depth [µm]	Channel Length [mm]	Material	Price [€/chip] 1+	Price [€/chip] 10+
10000376	Straight channel chip Fluidic 268	2,500	290	58.5	PMMA	48.50	36.50
10000306	Straight channel chip Fluidic 268	2,500	290	58.5	Topas	48.50	36.50
10001136	Straight channel chip Fluidic 268	2,500	290	58.5	Zeonor	48.50	36.50
10001870	2 channel chip Fluidic 272 with waste reservoir	2,500	340	26.0	PMMA	52.50	40.50
10000347	2 channel chip Fluidic 272 with waste reservoir	2,500	340	26.0	Topas	52.50	40.50
10000313	4 channel chip Fluidic 138	1,000	340	58.5	PMMA	48.50	36.50
10000307	4 channel chip Fluidic 138	1,000	340	58.5	Topas	48.50	36.50

4.2 Self-sealing and releasable chips – slide format

For some tasks it is desired to mount a microfluidic device on a surface and remove it afterwards for further operations. This might be the case, if an array on a glass surface should be further processed or if specimens should be removed from the microfluidic device.

microfluidic ChipShop's self-sealing and releasable chip address this task: With a soft component being part of the microfluidic device a liquid tight sealing on planar and clean surfaces can be achieved by a certain pressure. Removal of the microfluidic chip from the glass device can be done easily after completion of the fluidic operation. Next to the microfluidic chip a respective handling frame is at hand.

4.2.1 Self-sealing and releasable chips – slide format

The self-sealing and releasable chips can be mounted liquid tight on flat and clean surfaces by applying a homogenous pressure on the surface. For this task, respective handling frames are at hand to allow for a convenient operation of the chips.

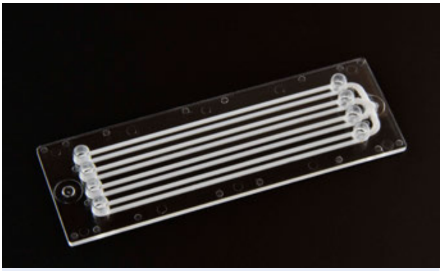


Fig. 473: Fluidic 745 – Self-sealing and releasable chip

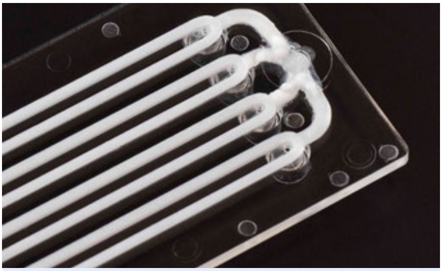


Fig. 474: Detail of the channels formed by a soft component material on Fluidic 745 – Self-sealing and releasable chip

Product Code for Fluidic 745	Volume [µl]	Channel Width [mm]	Channel Depth [mm]	Lid Thickness [µm]	Material	Surface Treatment	Price [€/chip] 10+	Price [€/chip] 100+
10001053	11.8	1.0	0.2	125	PS	-	27.30	19.10
10001054	11.8	1.0	0.2	125	PS	hydrophilized	34.30	21.40

4.2.2 Handling frame for self-sealing and releasable chips – for slide-format chips

Fig. 475: Handling frame for self-sealing and releasable chips in slide-format

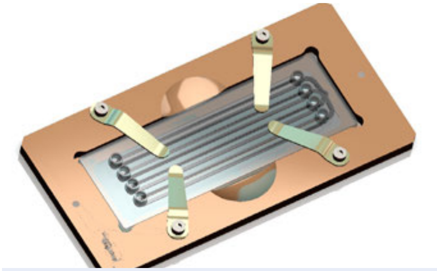


Fig. 476: Handling frame with chip – self-sealing and releasable chips

Product Code	Description	Price [€] 1+	Price [€] 5+
10001090	Handling-frame for self-sealing and releasable chips in slide-format	244.00	204.00

4.3 Sensor integration chips

Frequently, one wants to evaluate the combination of microfluidics and sensors, e.g. silicon photonic or electrochemical sensors. Chips of the sensor integration family were developed especially for this need and are available in a range of complexities.

One design feature all sensor integration chips have in common: an area for easy sensor installation, either as chamber or open area. In both cases the sensor of choice can be mounted via a double-sided adhesive tape gasket. At the same time the specific adhesive tape cut-out, with a height of 140 μm, is an integral part of the fluidic system. Adhesives with multiple cut-out shapes are possible and have to be ordered separately. On request adhesive tapes can also be customized. Examples of possible cut-outs are shown below.

Depending on chip design sensor integration chips furthermore feature turning vales, mixers, bubble traps and reaction or waste chambers. With this diverse range of sensor integration chips a variety of experimental setups is made possible.

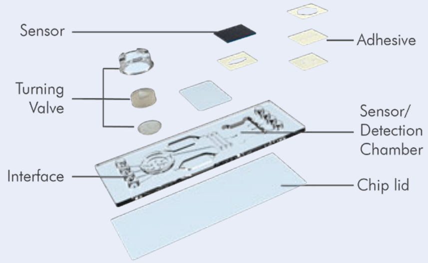


Fig. 477: Exploded view drawing of a sensor integration chip

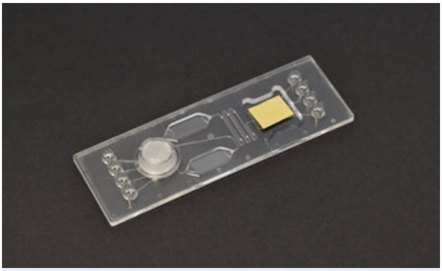


Fig. 478: Fully assembled sensor integration chip

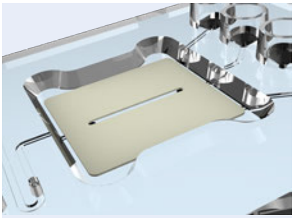


Fig. 479: Double-sided adhesive tape gasket – straight channel

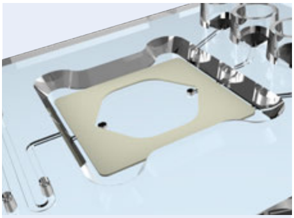


Fig. 480: Double-sided adhesive tape gasket – rhombic chamber

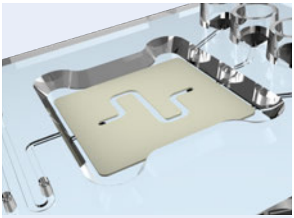


Fig. 481: Double-sided adhesive tape gasket – curved channel

4.3.1 Sensor integration chips – Basic sensor platforms

The two basic sensor platforms are the simplest versions of sensor integration chips. These chips with Mini Luer interfaces possess a sensor integration area, either with an inbuilt, lowered rhombic chamber (basic sensor platform I - Fluidic 864) or with a flat sensor integration area surface (basic sensor platform II - Fluidic 1005). Therefore, for Fluidic 864 sensor mounting can be facilitated only with the compatible rhombic chamber cut-out adhesive tape, while in case of Fluidic 1005 two standard adhesive tape gaskets are available. Also, custom-designed adhesive tape gaskets are a feasible option for Fluidic 1005.

Apart from their sensor integration area, Fluidic 864 and Fluidic 1005 are very similar in design. However, Fluidic 1005 comes with two additional inlets and outlets, each.

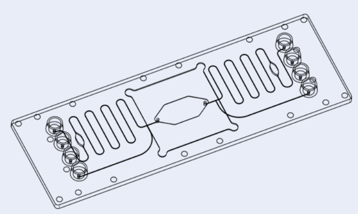


Fig. 482: Schematic drawing of basic sensor platform I - Fluidic 864

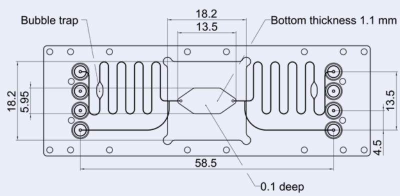


Fig. 483: Detailed schematic drawing of basic sensor platform I - Fluidic 864

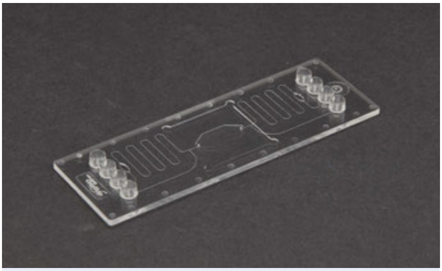


Fig. 484: Basic sensor platform I - Fluidic 864

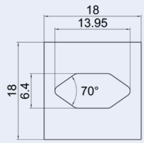


Fig. 485: Dimensions of adhesive tape gasket for Fluidic 864

Product Code for Fluidic 864	Description	Channel Width [µm]	Channel Depth [µm]	Lid Thickness [µm]	Material	Price [€/chip]* 1+	10+	100+
10001351	Basic sensor platform I	100	100	140	Topas	48.50	36.50	22.40
10001352	Basic sensor platform I	100	100	188	Zeonor	48.50	36.50	22.40

* does not include adhesive tape gasket

Product Code	Description	Thickness [µm]	Price [€/tape] 1+	10+	100+
10001360	Adhesive tape gasket for Fl. 864 - rhombic chamber	140	3.35	2.10	1.65

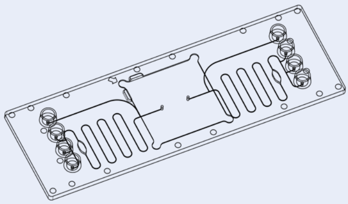


Fig. 486: Schematic drawing of basic sensor platform II - Fluidic1005

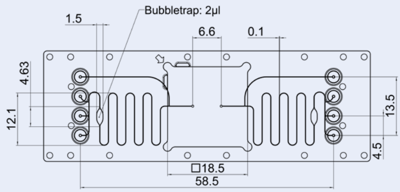


Fig. 487: Detailed schematic drawing of basic sensor platform II - Fluidic 1005

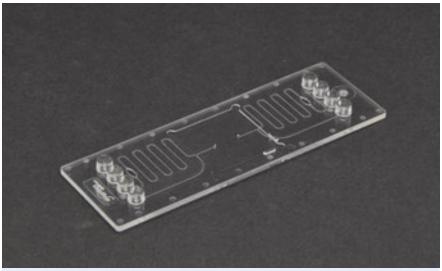


Fig. 488: Basic sensor platform II - Fluidic 1005

Product Code for Fluidic 1005	Description	Channel Width [µm]	Channel Depth [µm]	Lid Thickness [µm]	Material	Price [€/chip]* 1+	10+	100+
10001353	Basic sensor platform II	100	100	140	Topas	48.50	36.50	22.40
10001354	Basic sensor platform II	100	100	188	Zeonor	48.50	36.50	22.40

* does not include adhesive tape gasket

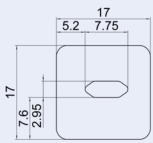


Fig. 489: Dimensions of adhesive tape gasket for Fluidic 1005 - rhombic chamber shape

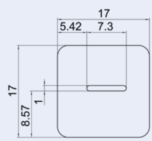


Fig. 490: Dimensions of adhesive tape gasket for Fluidic 1005 - straight channel shape

Product Code	Description	Thickness [µm]	Price [€/tape] 1+	10+	100+
10001361	Adhesive tape gasket for Fl. 1005 - rhombic chamber shape	140	3.35	2.10	1.65
10001362	Adhesive tape gasket for Fl. 1005 - straight channel shape	140	3.35	2.10	1.65

4.3.2 Sensor integration chips – Turning valve sensor platforms

The turning valve sensor platform belong to the simpler chips of the sensor integration chip family. These platforms allow to mount a sensor with maximum dimensions of 11.5 mm x 10.5 mm in a prepared cavity with six switchable inlets and one outlet. The channels have a dimension of 400 μm width and 150 μm depth.

The two chips belonging to this family only differ by a small bubble trapping chamber prior to the sensor integration area. Thus, if working with samples that tend to form bubbles, the platform Fluidic 1156 is recommended.

The valve can be operated with the manual turning valve actuator or the ChipGenie TV instrument.

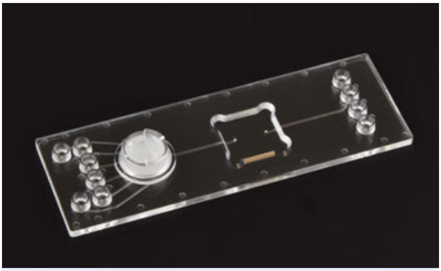


Fig. 491: Turning valve sensor platform I Fluidic 673 with Mini Luer interfaces

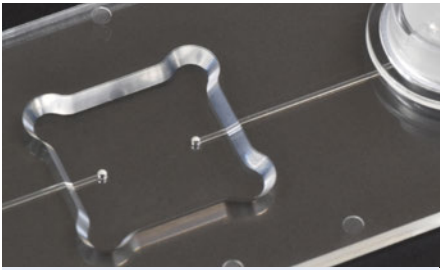


Fig. 492: Detail of the sensor integration area on Fluidic 673 without sensor

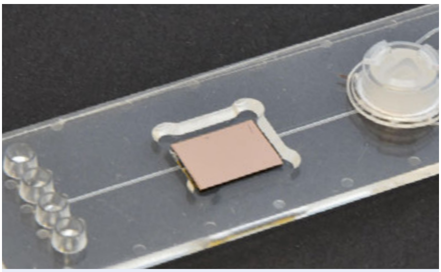


Fig. 493: Detail of the sensor integration area on Fluidic 673 with attached sensor

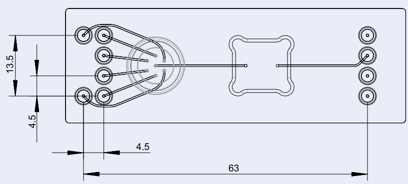


Fig. 494: Schematic drawing of turning valve sensor platform I Fluidic 673

Product Code for Fluidic 673	Description	Material	Lid Thickness [μm]	Price [€/chip]* 1+	10+	100+
10000794	Sensor platform	PMMA	175	62.20	44.30	26.10
10000795	Sensor platform	Topas	140	62.20	44.30	26.10
10000796	Sensor platform	PC	175	62.20	44.30	26.10
10000797	Sensor platform	Zeonor	188	62.20	44.30	26.10

* does not include adhesive tape gasket

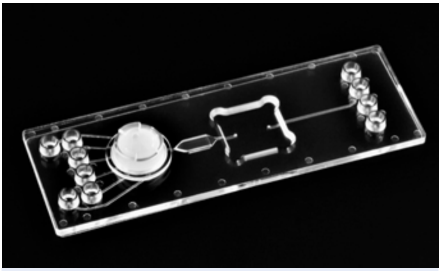


Fig. 495: Turning valve sensor platform II Fluidic 1156

Fig. 496: Detail turning valve sensor platform II Fluidic 1156

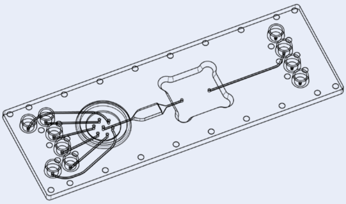


Fig. 497: Turning valve sensor platform II Fluidic 1156 with bubble trap and Mini Luer interfaces

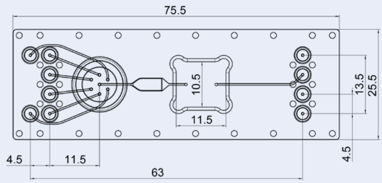


Fig. 498: Schematic drawing of turning valve sensor platform II Fluidic 1156

Product Code for Fluidic 1156	Description	Material	Lid Thickness [µm]	Price [€/chip]*		
				1+	10+	100+
10001800	Sensor platform Fluidic II	Topas	140	62.20	44.30	26.10
10001801	Sensor platform Fluidic II	PS	125	62.20	44.30	26.10
10002078	Sensor platform Fluidic II	PC	175	62.20	44.30	26.10
10002079	Sensor platform Fluidic II	Zeonor	188	62.20	44.30	26.10
10002080	Sensor platform Fluidic II	PMMA	175	62.20	44.30	26.10

* does not include adhesive tape gasket

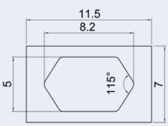


Fig. 499: Schematic drawing of adhesive tape gasket for Fluidic 673; 862; 953, 1156 - rhombic chamber shape

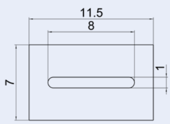


Fig. 500: Schematic drawing of adhesive tape gasket for Fluidic 673; 862; 953, 1156 - straight channel shape

Product Code	Description	Thickness [µm]	Price [€/tape]		
			1+	10+	100+
10001363	Adhesive tape gasket for Fluidic 673; 862; 953, 1156 - rhombic chamber shape	140	3.35	2.10	1.65
10001364	Adhesive tape gasket for Fluidic 673; 862; 953, 1156 - straight channel shape	140	3.35	2.10	1.65

4.3.3 Sensor integration chips – Multifunctional sensor platforms

These complex sensor integration chips provide a variety of funcitonalities. Design features include: multiple inlets steerable via turning valve; reaction chambers and a three-dimensional serpentine mixer structure prior to the sensor integration area.

Multifunctional sensor platform I (Fluidic 862) includes Mini Luer interfaces on a microscope slide format and contains a single sensor integration area.

Multifunctional sensor platform II (Fluidic 953) comes with Luer interfaces on a double microscope slide format. This chip includes two sensor integration areas and a large (waste) chamber of 500 μl volume.

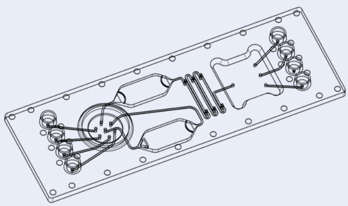


Fig. 501: Schematic drawing of multifunctional sensor platform I - Fluidic 862

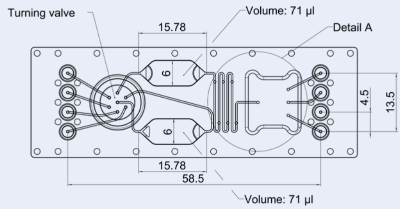


Fig. 502: Detailed schematic drawing of multifunctional sensor platform I - Fluidic 862

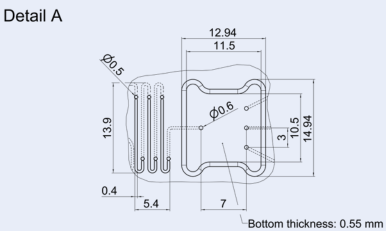


Fig. 503: Fluidic 862 - Detailed schematic drawing of serpentine mixer and sensor integration area

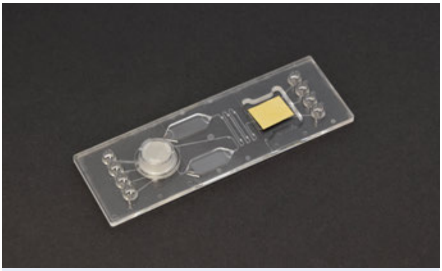


Fig. 504: Multifunctional sensor platform I Fluidic 862 with mounted sensor

Product Code for Fluidic 862	Description	Lid Thickness [μm]	Material	Price [€/chip]* 1+	10+	100+
10001355	Multifunctional sensor platform I	140	Topas	62.20	44.30	26.10
10001356	Multifunctional sensor platform I	188	Zeonor	62.20	44.30	26.10

* does not include adhesive tape gasket

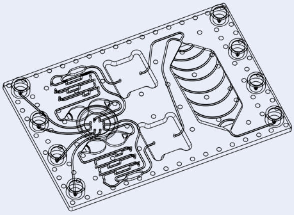


Fig. 505: Schematic drawing of multifunctional sensor platform II - Fluidic 953

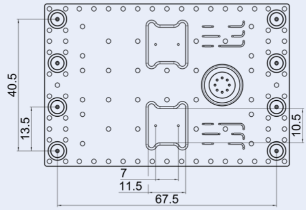


Fig. 506: Detailed schematic drawing of multifunctional sensor platform II - Fluidic 953

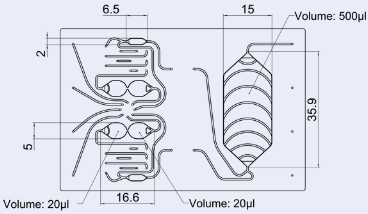


Fig. 507: Detailed schematic drawing of multifunctional sensor platform II - Fluidic 953

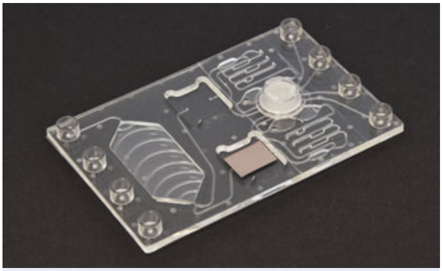


Fig. 508: Multifunctional sensor platform II Fluidic 953 with one mounted sensor

Product Code for Fluidic 953	Description	Lid Thickness [µm]	Material	Price [€/chip]*		
				1+	10+	100+
10001357	Multifunctional sensor platform II	140	Topas	79.50	63.50	42.50

* does not include adhesive tape gasket

Product Code	Description	Thickness [µm]	Price [€/tape]		
			1+	10+	100+
10001363	Adhesive tape gasket for Fluidic 673; 862; 953, 1156 - rhombic chamber shape	140	3.35	2.10	1.65
10001364	Adhesive tape gasket for Fluidic 673; 862; 953, 1156 - straight channel shape	140	3.35	2.10	1.65

4.3.4 Sensor integration chips – Large sensor integration area platforms

Two available platforms with a larger sensor integration area are interfaced via Mini Luer ports. Liquid supply from a multitude of inlets is controlled with two turning vales, while one outlet is located on the platforms. The main difference between Large sensor integration area platform I (Fluidic 1004) and Large sensor integration area platform II (Fluidic 1012) is their channel positioning within the sensor area. Compatible standard adhesive tape gaskets for sensor mounting are available in straight channel (Fluidic 1004 and Fluidic 1012) and rhombic chamber (Fluidic 1004) shape.

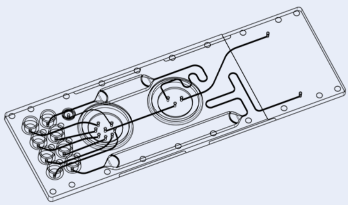


Fig. 509: Schematic drawing of large sensor integration area platform I - Fluidic 1004

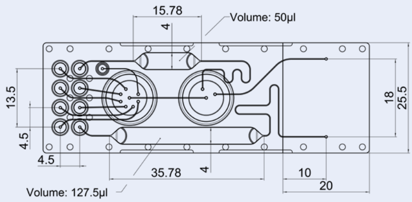


Fig. 510: Detailed schematic drawing of large sensor integration area platform I - Fluidic 1004

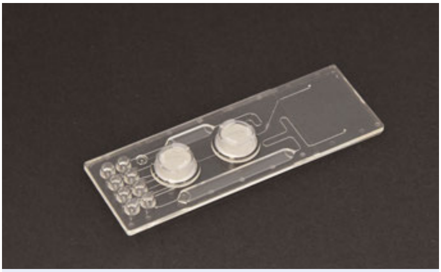


Fig. 511: Large sensor integration area platform I - Fluidic 1004

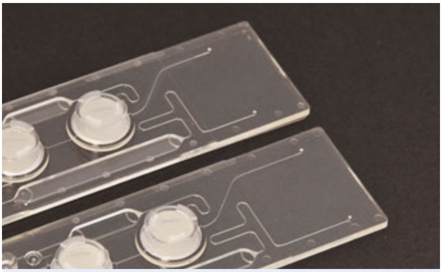


Fig. 512: Comparison of Large sensor integration area platform I - Fluidic 1004 (top) and Large sensor integration area platform II - Fluidic 1012 (bottom)

Product Code for Fluidic 1004	Description	Lid Thickness [µm]	Material	Price [€/chip]* 1+	10+	100+
10001169	Large sensor integration area platform I	188	Zeonor	79.50	63.50	42.50
10001358	Large sensor integration area platform I	140	Topas	79.50	63.50	42.50
10002081	Large sensor integration area platform I	125	PS	79.50	63.50	42.50

* does not include adhesive tape gasket

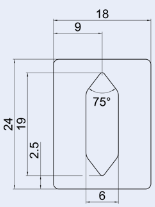


Fig. 513: Schematic drawing of adhesive tape gasket for Fluidic 1004 - straight rhombic shape

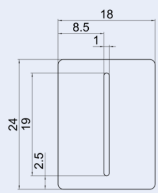


Fig. 514: Schematic drawing of adhesive tape gasket for Fluidic 1004 - straight channel shape

Product Code	Description	Thickness [µm]	Price [€/tape] 1+	10+	100+
10001365	Adhesive tape gasket for Fluidic 1004 - rhombic chamber shape	140	3.35	2.10	1.65
10001366	Adhesive tape gasket for Fluidic 1004 - straight channel shape	140	3.35	2.10	1.65

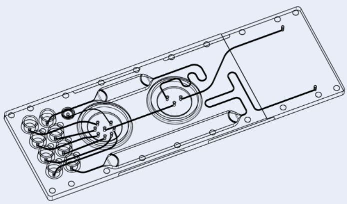


Fig. 515: Schematic drawing of large sensor integration area platform II - Fluidic 1012

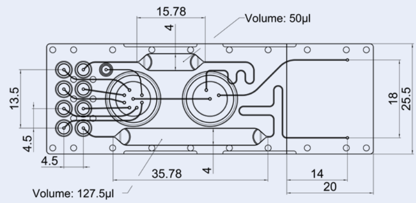


Fig. 516: Detailed schematic drawing of large sensor integration area platform II - Fluidic 1012

Fig. 517: Large sensor integration area platform II - Fluidic 1012

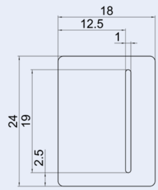


Fig. 518: Schematic drawing of adhesive tape gasket for Fluidic 1012 - straight channel shape

Product Code for Fluidic 1012	Description	Lid Thickness [µm]	Material	Price [€/chip]* 1+	10+	100+
10001359	Large sensor integration area platform II	140	Topas	79.50	63.50	42.50
10002071	Large sensor integration area platform II	125	PS	79.50	63.50	42.50
10002088	Large sensor integration area platform II	188	Zeonor	79.50	63.50	42.50

* does not include adhesive tape gasket

Product Code	Description	Thickness [µm]	Price [€/tape] 1+	10+	100+
10001367	Adhesive tape gasket for Fluidic 1012 - straight channel shape	140	3.35	2.10	1.65

4.4 Fiber sensor integration chips

The *PreSens* SensorPlug system is a cutting-edge solution for non-invasive, online monitoring in the field of microfluidics. *microfluidic ChipShop* offers chips specifically designed to seamlessly integrate *PreSens'* SensorPlugs and carry out-real time monitoring of different parameters.

The ready-to-use SensorPlugs consist of a Mini Luer interface, an optical fiber for read-out and a specific sensor at the tip of the fiber. The pre-calibrated sensors are mounted directly onto the microfluidic channel, ensuring that the sensor get's into contact with the fluid pathway. The direct interface allows for continous monitoring of various parameters, providing data on crucial variables like pH levels, and dissolved O_2 and CO_2 concentrations, in microscale fluidic environments.

Combining our expertise in microfluidics with *PreSens'* sensor-technology, provides an advanced solution for dynamic, non-invasive & high-resolution monitoring of crucial parameters in microsystems.


Fig. 519: Four PreSens' SensorPlugs on adjacent microfluidic channels

Fig. 520: Components of the PreSens' monitoring system

Please note: The chips are only recommended for low-pressure applications, in order to avaoid leakage at the sensor ports. If you don't need all of the sensor ports we recommend to close them with our mini Luer plugs (10000054) or mini Luer caps (10001687) in TPE.

The basic fiber sensor chip **Fluidic 1090** features three rhombic chambers, with sensor ports before and after the chambers, thereby serving as stand-alone device for execution and monitoring of a chemical or biological reaction.
All designs feature bubble traps, preventing that air bubbles in the system will interfere with the readout.

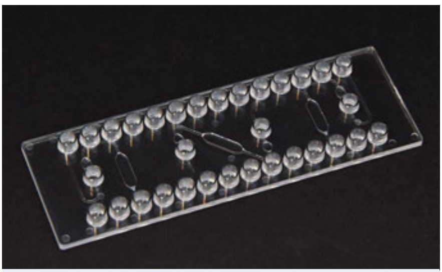


Fig. 521: Basic fiber sensor chip Fluidic 1090

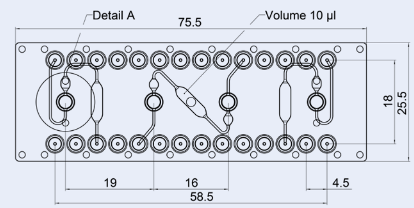


Fig. 522: Schematic drawing chip Fluidic 1090

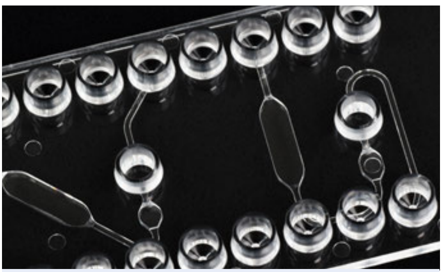


Fig. 523: Detail of the basic fiber sensor chip Fluidic 1090 with sensor ports in the middle

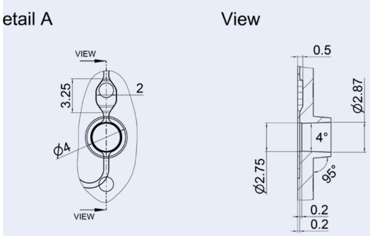


Fig. 524: Detail of the basic fiber sensor chip Fluidic 1090

Product Code for Fluidic 1090	Description	Lid Thickness [µm]	Material	Price [€/chip]* 1+	10+	100+
10001496	Basic fiber sensor chip	125	PS	42.20	34.30	26.10
10001500	Basic fiber sensor chip	188	Zeonor	42.20	34.30	26.10

* without SensorPlugs, must be purchased at PreSens

The in-line fiber sensor chip **Fluidic 1457** features a straight channel along which in total four different SensorPlugs can be connected. It serves as detection unit up- or downstream of a microfluidic flow cell in which a reaction is taking place.

Fig. 525: In-line fiber sensor chip Fluidic 1457

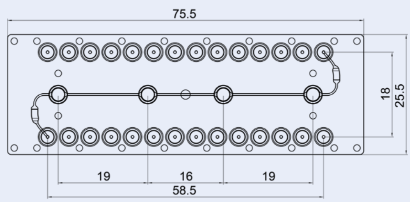


Fig. 526: Schematic drawing of the in-line fiber sensor chip Fluidic 1457

Product Code for Fluidic 1457	Description	Lid Thickness [µm]	Material	Price [€/chip]* 1+	10+	100+
10002024	In-line fiber sensor chip	140	Topas	42.20	34.40	26.10

* without SensorPlugs, must be purchased at PreSens

The fiber sensor cell culture chip **Fluidic 1611** features two identical units per chip. Each unit consists of two interconnected rhombic chambers, in which cell cultivation takes places, as well as a sensor port up- and downstream of the cultivation chambers. By measuring curcial parameters one can draw conclusions on the cell viability or metabolic activity of the choosen, adherent cell line.

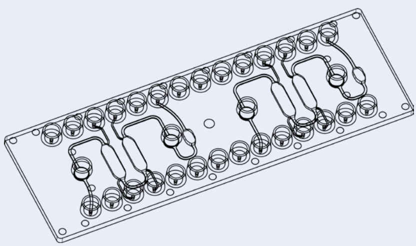


Fig. 527: Fiber sensor cell culture chip Fluidic 1611

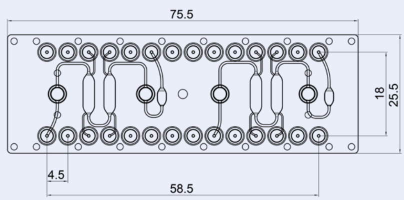
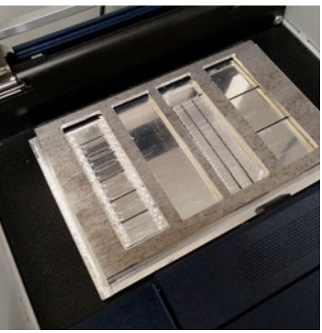
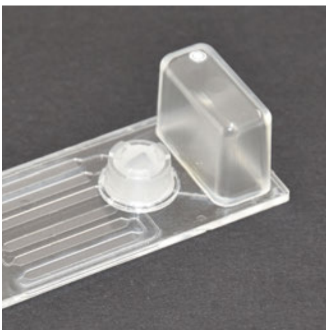


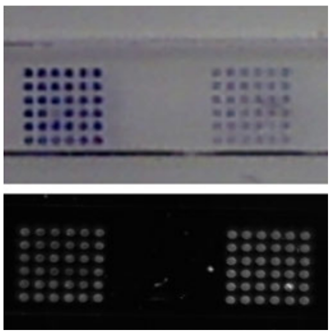
Fig. 528: Schematic drawing of the fiber sensor cell culture chip Fluidic 1611

Product Code for Fluidic 1090	Description	Lid Thickness [µm]	Material	Price [€/chip]* 1+	10+	100+
10001496	Basic fiber sensor chip	125	PS	42.20	34.30	26.10
10001500	Basic fiber sensor chip	188	Zeonor	42.20	34.30	26.10

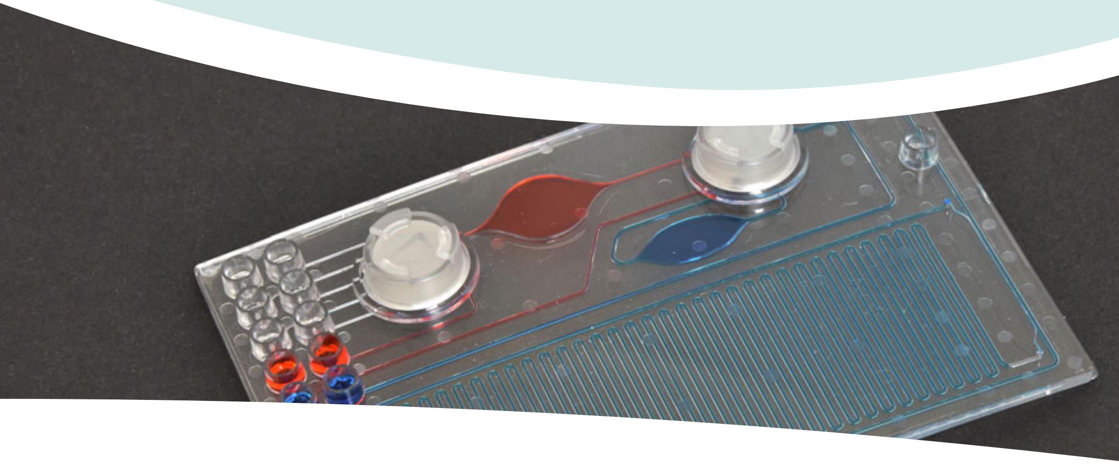
* without SensorPlugs, must be purchased at PreSens







5 Microfluidic chips – Integrated chips



Microfluidic chips – Integrated chips

This chapter summarizes various integrated chips combining different fluidic functions. Depending on the operator's choice, these chips can be used for a variety of applications ranging from immunoassays, molecular based assays to the detection of small molecules. On request the surface can be modified or for hybridization assays DNA or protein arrays can be integrated. For any custom modification of these devices, please contact us for feasibility and pricing.

5.1 Assay chip 1 – on board metering, mixing and reaction

This integrated chip allows for the development of biological assays on chip. The chip enables for on-chip metering, mixing and the detection of the reaction in a separate chamber.

For this purpose the chip is equipped with the following main elements:

- Metering cavity with 15 µl volume
- Metering loop with 17 µl volume
- Mixing chamber with 102 µl volume
- Reaction & detection chamber with 20 µl volume
- Two turning valves

The liquids are controlled with the help of two turning valves, overfilling of the detection chamber is prevented through a liquid tight membrane, the sample can be introduced through the female Luer interface and further reagents or air pressure can be supplied through the female Mini Luer interfaces. To operate this chip Luer and Mini Luer male fluid connectors, Luer and Mini Luer plugs as well as silicone and Teflon tubings are of use to allow for the connection of the chip with pumps. Direct filling of the chip with a pipette is possible, the use of pipette connectors is appreciated by several operators. The turning valves can be rotated with a special manual turning valve manipulator. All these accessories are combined in the **integrated chip support kit 1**.

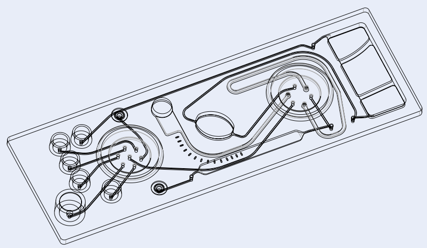


Fig. 529: Schematic drawing of assay chip 1 – Fluidic 429

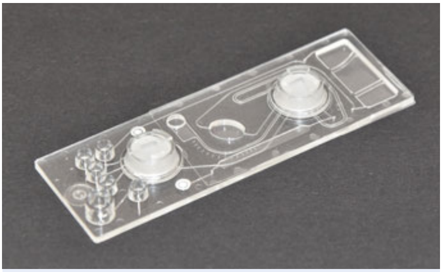


Fig. 530: Assay chip 1 – Fluidic 429 with on-chip metering, mixing, reaction and detection chamber and two integrated turning valves

Product Code for Fluidic 429	Description	Material	Lid Thickness [µm]	Price [€/chip] 1+	10+	100+
10000373	Assay chip 1	Topas	140	84.85	43.90	27.56

Product Code	Kit Type	Product Description	Product Code	Price [€/kit]
10001652	Integrated chip support kit 1	- Male Mini Luer fluid connectors, green, material: PP (10)	10000029	197.14
		- Male Mini Luer fluid connectors, opaque, material: TPE (10)	10000116	
		- Male Mini Luer plugs, red, material: PP (10)	10000053	
		- Male Mini Luer plugs, opaque, material: TPE (10)	10000054	
		- Male Luer fluid connectors, green, material: PP (10)	10000081	
		- Male Luer plugs, opaque, material: PP (10)	10000230	
		- Mini Luer to pipette adapter, material: PP (10)	10000057	
		- Silicone tube (ID: 0.5 mm, OD: 2.5 mm, 1 m) (2)	10000033	
		- PTFE tube (ID: 0.5 mm, OD: 1 mm, 1 m) (5)	10000032	
		- Manual turning valve actuator (1)	10000742	
		- Handling frame with high skirt, yellow (1)	10000042	

5.2 Assay chip 2 – turning valve assisted fluid control with separate assay and reference cavities

5.2.1 Assay chip 2 – turning valve assisted fluid control with separate assay and reference cavities

This integrated chip allows for the development of hybridization assays on chip. Six 12 µl cavities with 200 µm depth can be used for spotting different kinds of arrays. Four of these chambers are are operated in row, two further separately. The separate chambers allow e.g. for control or quantification reactions and have pre-cavities to store dry reagents.

Sample injection is foreseen through a female Luer interface, reagent supply or air pressure through the female Mini Luer interfaces.

The chip is equipped with the following main elements:

- 6 reaction & detection chambers with 12 µl volume
- 2 pre-storage chambers with 12 µl volume
- 2 turning valves

The liquids are controlled with the help of two turning valves, sample injection is foreseen through a female Luer interface, reagent supply or air pressure through the female Mini Luer interfaces.

To operate this chip Luer and Mini Luer male fluid connectors, Luer and Mini Luer plugs as well as silicone and Teflon tubings are of use to allow for the connection of the chip with pumps. Direct filling of the chip with a pipette is possible, the use of pipette connectors is appreciated by several operators. The turning valves can be rotated with a special manual turning valve manipulator. All these accessories are combined in the **integrated chip support kit 1**.

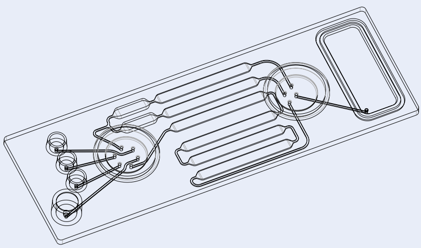


Fig. 531: Schematic drawing of assay chip 2 – Fluidic 292

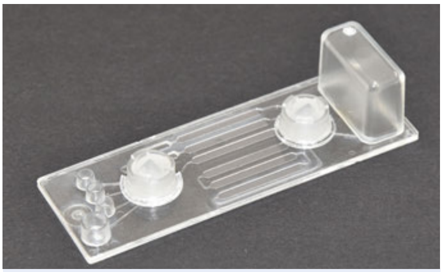


Fig. 532: Assay chip 2 – Fluidic 292 with hybridization chamber and integrated turning valve for fluid actuation

Product Code for Fluidic 292	Description	Material	Lid Thickness [µm]	Price [€/chip] 1+	10+	100+
10000374	Assay chip 2	Topas	140	88.50	49.45	28.98
10000609	Assay chip 2	Topas, black	140	88.50	49.45	28.98

5.2.2 Assay chip 2 – turning valve assisted fluid control with separate assay and reference cavities including integrated arrays

The assay chip 2 as described in the previous chapter can be ordered with integrated arrays. *microfluidic ChipShop* will spot the desired molecules (e.g. DNA probes, antibodies, antigens etc.) on the polymer surface and will cover the chip with the thin cover foil. Reagents like antibodies or antigens and reference material have to be provided by the customer or will be charged separately. For the order of a special array a process set-up needs to be ordered in advance.

Product Code	Description	Price [€]
80000082	Process set-up custom array integration	Please inquire

Product Code for Fluidic 292	Description	Material	Lid Thickness [µm]	Price [€/chip]		
				1+	10+	100+
10000610	Assay chip 2 with custom array	Topas	140	197.50	98.45	59.98
10000611	Assay chip 2 with custom array	Topas, black	140	197.50	98.45	59.98

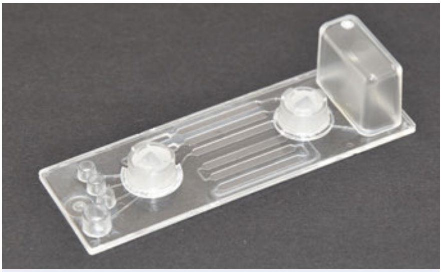


Fig. 533: Assay chip 2 – Fluidic 292 with embedded DNA array

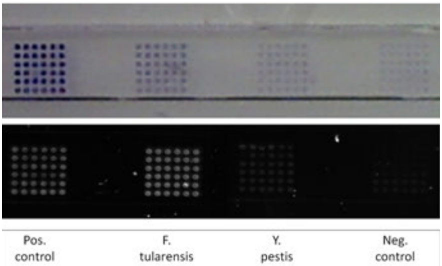


Fig. 534: Array integrated on chip

5.3 Assay chip 3 – Assay development chip for magnetic bead based or hybridization assays

A 300 µm deep central chamber with 30 µl inner volume is the reaction cavity of this chip. To keep the components in the chamber either magnetic beads can be used which need to be operated by an external magnet or catcher molecules have to be immobilized on the surface of the cavity. Controlled by two turning valves liquids can be supplied and removed, air pressure can be applied and venting can be ensured.

Liquid supply and air pressure are foreseen through the female Mini Luer interfaces on chip.
The chip is equipped with the following main elements:

- Cavity with 30 µl volume
- 2 turning valves

To operate this chip Mini Luer male fluid connectors, Mini Luer plugs as well as silicone and Teflon tubings are of use to allow for the connection of the chip with pumps. Direct filling of the chip with a pipette is possible, the use of pipette connectors is appreciated by several operators. The turning valves can be rotated with a special manual turning valve manipulator. All these accessories are combined in the **integrated chip support kit 3**.

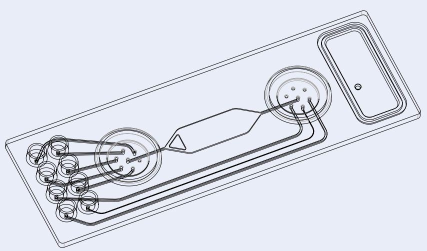


Fig. 535: Schematic drawing of assay chip 3 – Fluidic 490

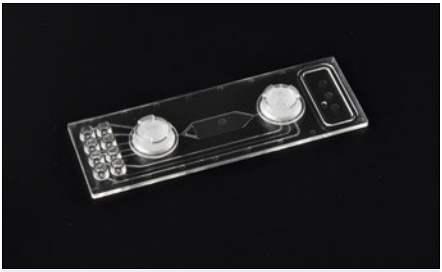


Fig. 536: Assay chip 3 – Fluidic 490 with central reaction chamber and integrated turning valve for fluid actuation

Product Code for Fluidic 490	Description	Material	Lid Thickness [µm]	Price [€/chip] 1+	10+	100+
10000375	Assay chip 3	Topas	140	75.40	42.45	26.37

Product Code	Kit Type	Product Description	Product Code	Price [€/kit]
10001671	Integrated chip support kit 3	- Male Mini Luer fluid connectors, green, material: PP (10)	10000029	159.64
		- Male Mini Luer fluid connectors, opaque, material: TPE (10)	10000116	
		- Male Mini Luer plugs, red, material: PP (10)	10000053	
		- Male Mini Luer plugs, opaque, material: TPE (10)	10000054	
		- Mini Luer to pipette adapter, material: PP (10)	10000057	
		- Silicone tube (ID: 0.5 mm, OD: 2.5 mm, 1 m) (2)	10000033	
		- PTFE tube (ID: 0.5 mm, OD: 1 mm, 1 m) (5)	10000032	
		- Manual turning valve actuator (1)	10000742	
		- Handling frame with high skirt, yellow (1)	10000042	

5.4 Continuous-flow PCR chip with integrated sample preparation – Inline Chip

This integrated microfluidic chip combines the sample preparation, namely the extraction of DNA, and the later amplification of the DNA through continuous-flow-PCR. Reagents can be freely supplied through the various Mini Luer interfaces.

As accessories Mini Luer interfaces, Mini Luer plugs, silicone and PTFE tubes and the manual turning valve actuator are of use.

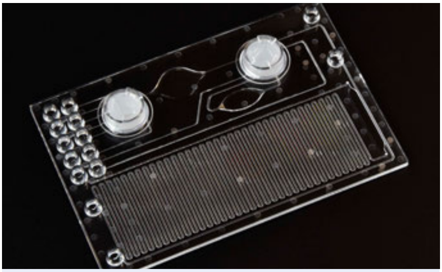


Fig. 537: Schematic drawing of integrated continuous flow PCR chip with sample preparation – Fluidic 501

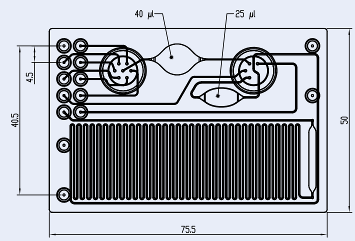


Fig. 538: Integrated continuous flow PCR chip with sample preparation – with dimensional measures

Product Code for Fluidic 501	Lid Thickness [µm]	Material	Comments Design, Channel Dimensions	Price [€/chip] 1+	10+	100+
10000358	175	PC	Integrated continuous flow chip, 35 cycles, PCR meander 200 µm deep & 400 µm wide, one 40 µl, one 25 µl cavity	132.98	64.60	39.76
10000357	125	Topas	Integrated continuous flow chip, 35 cycles, PCR meander 200 µm deep & 400 µm wide, one 40 µl, one 25 µl cavity	132.98	64.60	39.76
10000356	188	Zeonor	Integrated continuous flow chip, 35 cycles, PCR meander 200 µm deep & 400 µm wide, one 40 µl, one 25 µl cavity	132.98	64.60	39.76

Product Code	Kit Type	Product Description	Product Code	Price [€/kit]
10001672	Integrated chip support kit 4	- Male Mini Luer fluid connectors, green, material: PP (10) - Male Mini Luer fluid connectors, opaque, material: TPE (10) - Male Mini Luer plugs, red, material: PP (10) - Male Mini Luer plugs, opaque, material: TPE (10) - Mini Luer to pipette adapter, material: PP (10) - Silicone tube (ID: 0.5 mm, OD: 2.5 mm, 1 m) (2) - PTFE tube (ID: 0.5 mm, OD: 1 mm, 1 m) (5) - Manual turning valve actuator (1)	10000029 10000116 10000053 10000054 10000057 10000033 10000032 10000742	144.64

5.5 Immunofiltration System for Analytical Applications: IFSA 1 Immunoassay Chip - Microfilter-based enrichment and detection system for immunoassays

The IFSA chip family combines lab-on-a-chip technology with the advantages of microfilter-based assays, namely the enrichment of the sample through filtration and specific binding on the microfilter surface. Detection takes place directly on the microfilter surface as colorimetric or fluorescence detection depending on the chosen dye.

The IFSA 1 Immunoassay Chip can be equipped either with specific antibodies or antigens coated on the microfilter or with anti-haptene surface allowing for an afterwards specific functionalization of the IFSA 1 Immunoassay Chip by the user himself.

As a perfect merger of lab-on-a-chip and labautomation, the chip can be pre-equipped with dry or liquid reagents to be operated by a standard pipetting robot. Read-out can be done in standard 1536 well plate readers.

Chip-based microfilter technology is a collaborative work within the project IFSA together with the FZMB and Senova GmbH.

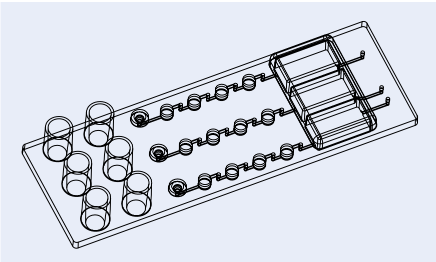


Fig. 539: Schematic drawing of IFSA 1 Immunoassay Chip – Fluidic 249

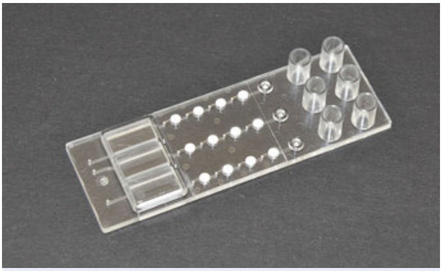


Fig. 540: IFSA 1 Immunoassay Chip – Equipped for three different samples with two measurement microfilters, one positive and one negative control microfilter

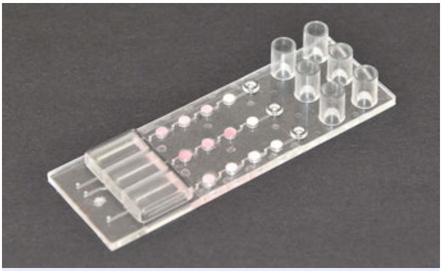


Fig. 541: Detail of stained microfilter area of IFSA 1 Immunoassay Chip

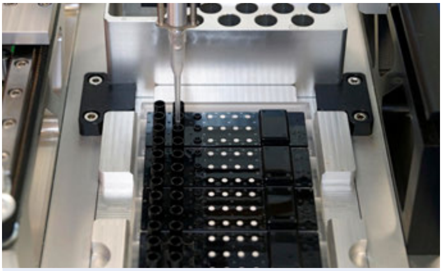


Fig. 542: IFSA 1 Immunoassay Chip in use

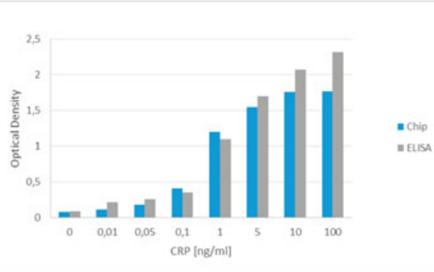


Fig. 543: Comparison of IFSA 1 Immunoassay Chip with standard ELISA for CRP detection (polyHRP / TMB) based on colorimetric read-out

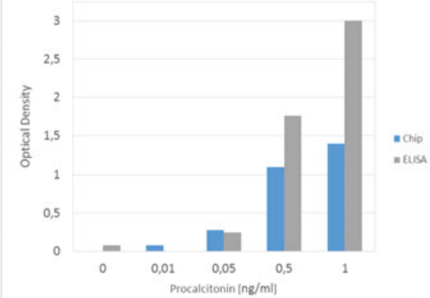


Fig. 544: Comparison of IFSA 1 Immunoassay Chip with standard ELISA for Procalcitonin detection (polyHRP / TMB) based on colorimetric read-out

Product Code	Description	Price [€]
10001208	Process set-up custom immunoassay on chip – pilot study – antibodies / antigens for immobilization will be charged separately or delivered by customer	22,980.00

Product Code	Embedded Microfilters	Functional Description	Chip Material	Price [€/chip]* 50+	100+
10000314	- Negative control - Positive control (anti POD) - Anti hapten 1 - Anti hapten 2	IFSA 1 Immunoassay Chip pre-equipped with two generic micro-filters for custom immunoassay and positive and negative control Application note	Topas	64.70	29.45

*For production quantities, please ask for a quote.

Product Code	Description	Detail	Price [€]
10001093	IFSA 1 Immunoassay Chip Reagent Kit 1 - V2	1. Wash buffer, 75 ml 2. Sample buffer, 50 ml 3. Conugate (streptavidin-HRP), 30 ml 4. Substrate (TMB), 30 ml 5. Hapten 1-conjugation reagent: 0.2 mg 6. Hapten 2-conjugation reagent: 0.2 mg	262.00
10001215	IFSA 1 Immunoassay Chip Demonstration Reagent Kit 1	Reagent Kit for 20 chips comprising: 1. Wash buffer, 75 ml 2. Sample buffer, 20 ml 3. Conjugate (Streptavidin-HRP), 15 ml 4. Substrate (TMB), 15 ml 5. Anti-hCRP-hapten 1-conugate, 50 µg 6. Anti-hPCR-hapten 2-conugate, 50 µg 7. Anti-hCRP-biotin-conjugate, 50 µg 8. Anti-hPCT-biotin-conjugate, 50 µg 9. Human C-reactive protein, 50 µg 10. Human procalcitonin, 20 µg	540.00

5.6 Assay chip 4

Assay chip e.g. for cell-based assays that can be fluidically operated using hydrostatic pressure generated by attached liquid filled tanks. The chip possesses Luer interfaces with piercing structure which can only be used with male Luer tanks. The interfaces are not compatible with the male Luer connectors. For closing of interfaces, we recommend the use of plugs such as Fluidic 270, 262 or caps Fluidic 1231.

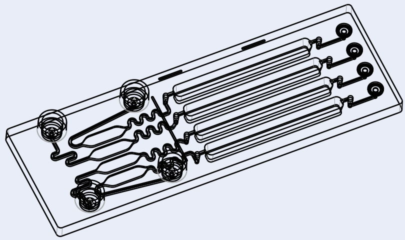


Fig. 545: Schematic drawing of assay chip 4, Fluidic 638

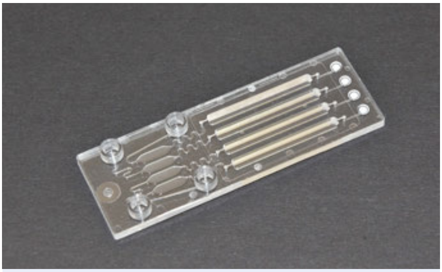


Fig. 546: Assay chip 4 (Fluidic 638)

Product Code for Fluidic 638	Chamber Volume [µl]	Chamber Depth [µm]	Lid Thickness [µm]	Material	Surface Treatment	Price [€/chip] 1+	10+	100+
10001211	10	500	140	Topas	-	36.20	24.30	16.10
10001212	10	500	125	PS	-	36.20	24.30	16.10
10001213	10	500	140	Topas	hydrophilized	39.20	26.30	17.80
10001214	10	500	125	PS	hydrophilized	39.20	26.30	17.80

5.7 Agarose chamber assay chip

The agarose chamber chip Fluidic 1530 has been developed to introduce agarose beads into a trapping chamber, holding back the beads (but allowing smaller particel to pass). The agarose beads are coated in order to allow anealing of different cells or small molecules and thereby be used for isolation and purification tasks in various molecular biologic applications.

The chip features further in- and outlets, a large analysis chamber for optical read-out as well as two spots for blister integration, giving you the possibility to store reagents needed for the analysis, on-chip.

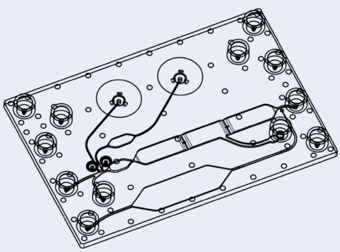
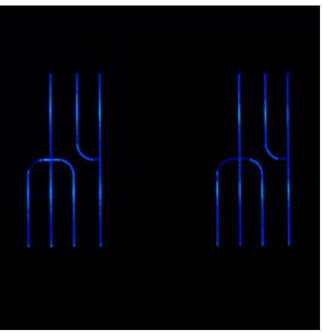


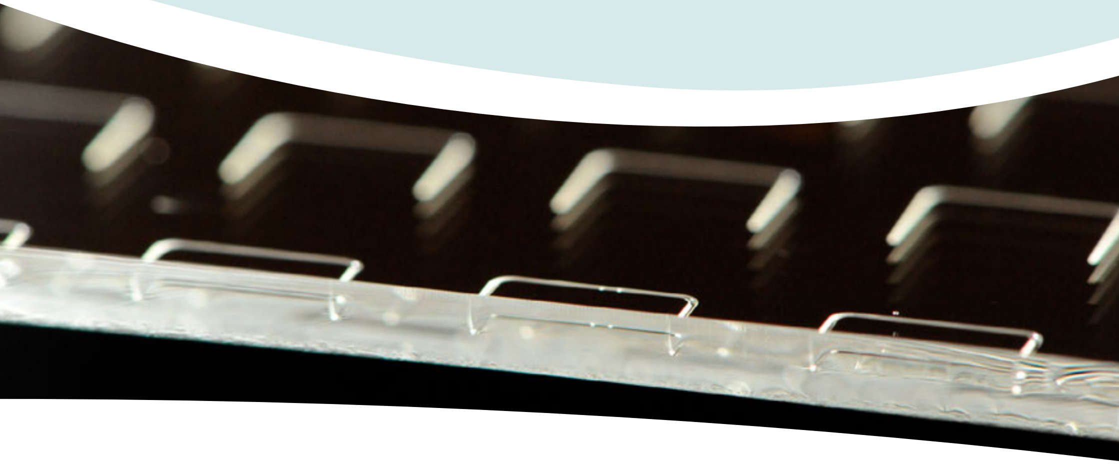
Fig. 547: Schematic drawing of agarose chamber chip

Fig. 548: Introduction of Agarose beads into the trapping chamber of chip Fluidic 1530

Product Code for Fluidic 1530	Lid Thickness [µm]	Material	Surface Treatment	Price [€/chip] 1+	10+	100+
1002067	140	Topas	-	52.75	43.00	32.60



6 Microfluidic chips – Glass



Microfluidic chips – Glass

Glass is the material of choice if elevated temperatures or organic solvents come into play. This chapters shows standard chips in glass in the format of a microscopy slide with through holes as fluidic interface. Droplet generator chips or meander chips are off-the-shelf devices in glass. Custom-designs can be realized on demand.

This chapter summarizes a variety of off-the-shelf glass devices. In order to facilitate the handling of these glass chips, respective accessories like handling frames are part of this section.

6.1 Standard microfluidic chips – glass

These glass chips have through-holes interfaces on the chip with spacing of 4.5 mm between each other.

6.1.1 Straight channel chips – glass

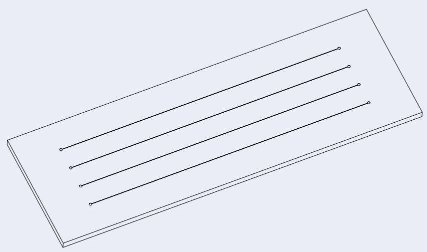


Fig. 549: Schematic drawing of straight channel glass chip – Fluidic 1072

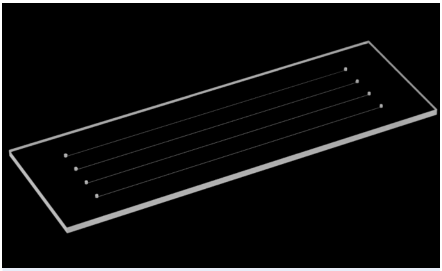


Fig. 550: Straight channel glass chip Fluidic 1072

Product Code for Fluidic 1072	Description	Channel Width [µm]	Depth [µm]	Length [mm]	Lid Thickness [µm]	Material	Price [€/chip] 1+	3+	5+	10+
10001444	Straight channel chip	100	37	58.5	210	Glass	149.70	115.75	105.78	95.70

6.1.2 Chamber chips – glass

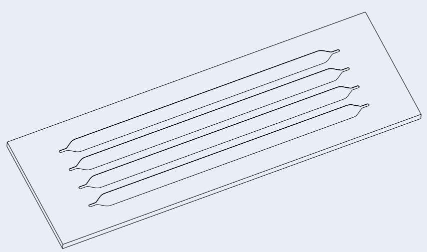


Fig. 551: Schematic drawing of chamber glass chips

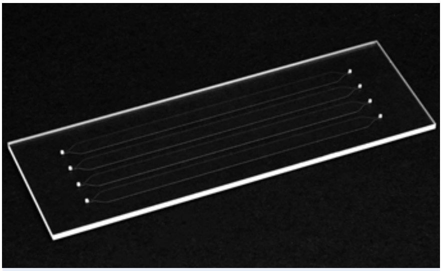


Fig. 552: Design Chamber glass chips Fluidic 1075 and 1195

Product Code	Fluidic	Description	Channel Width [mm]	Depth [µm]	Length [mm]	Lid Thickness [µm]	Material	Price [€/chip] 1+	3+	5+	10+
10001447	1075	Chamber chip	3.1	30	58.5	210	Glass	149.70	115.75	105.78	95.70
10001546	1195	Chamber chip	3.1	96	58.5	210	Glass	149.70	115.75	105.78	95.70

6.1.3 Droplet generator chips – glass

These off-the-shelf microfluidic devices are made for droplet generation on chip. Several microfluidic units embedded on one chip enable a parallel fabrication of droplets on chip.

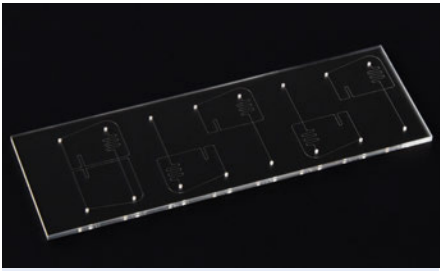


Fig. 553: Glass droplet generator chip Fluidic 1196

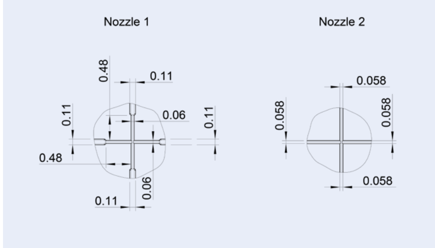


Fig. 554: Details of the droplet cross element 1 and 2

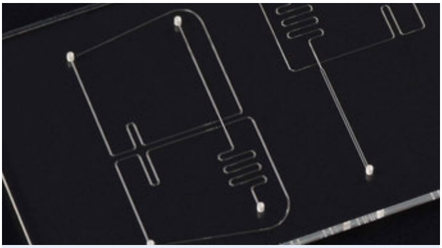


Fig. 555: Details of the droplet cross on chip Fluidic 1196

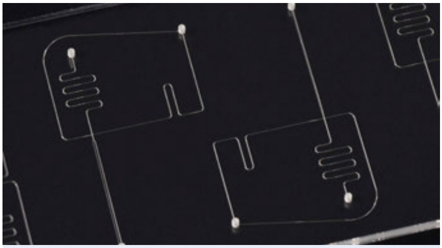


Fig. 556: Details of the droplet cross on chip Fluidic 1196

Product Code for Fluidic 1196	Description	Nozzle Depth [µm]	Lid Thickness [µm]	Material	Price [€/chip]			
					1+	3+	5+	10+
10001547	Droplet generator chip	20	210	Glass	149.70	115.75	105.78	95.70

6.1.4 Meander chips– glass

The meander chips can serve as reaction units as well as mixing device.

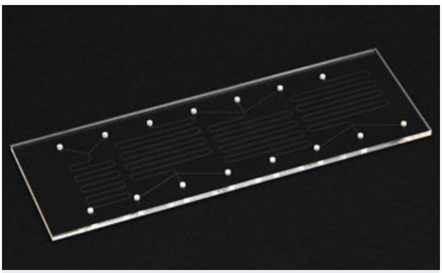


Fig. 557: Design Meander glass chips Fluidic 1077 and 1154

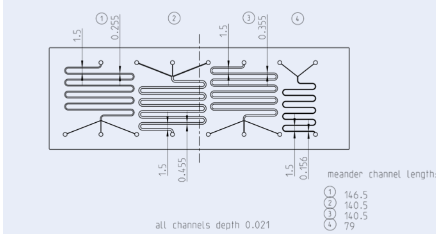


Fig. 558: Meander glass chip Fluidic 1077 channel details

Product Code	Fluidic	Description	Channel Depth [µm]	Lid Thickness [µm]	Material	Price [€/chip]			
						1+	3+	5+	10+
10001449	1077	Meander chip	21	210	Glass	149.70	115.75	105.78	95.70
10001528	1154	Meander chip	50	210	Glass	149.70	115.75	105.78	95.70

6.2 Accessories for standard glass chips

This chapter highlights some basic accessories making the direct use of *microfluidic ChipShop* glass chip series convenient.

6.2.1 Handling platform

This handling platform allows for the insertion of *microfluidic ChipShop's* standard glass chips in the format of a micoscopy slide, namely 75.5 mm x 25.5 mm x 1.65 mm. The fluidic interconnection is easily achieved by the fluidic interfaces integrated in the platform. For a standard use the fluidic interfaces – through holes on the chip, fluid connectors in the handling platform, are placed at standard positions having the spacing of a 386 well plate, namely 4.5 mm. This allows for a "one-fits-all" handling platform. Please refer to chapter 11.1 Lab-on-a-Chip Handling Platform/Cell Culture Incubator – LOC HP/CCI 1 for more information.

Fig. 559: Layout LOC HP/CCI 1 – Handling frame for chips in the format of a microscope slide

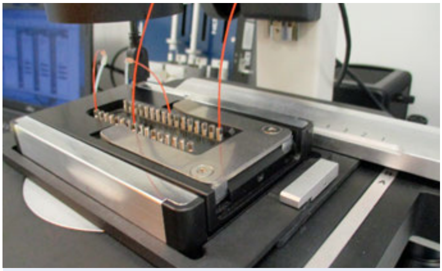
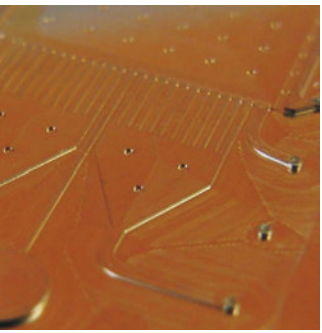


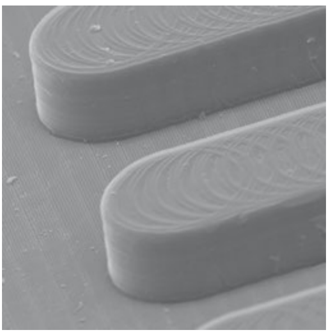
Fig. 560: LOC HP/CCI 1 is suitable for in-line imaging

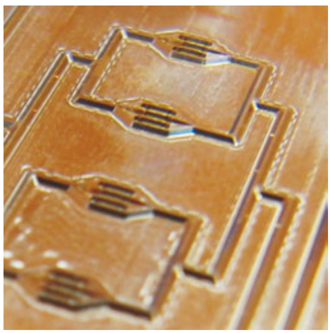
Product Code	Description	Adapter plate		Price [€]
		2x8	2x16	
10000893	LOC HP – without heating elements – handling frame for glass chips (incl. one adapter plate of your choice)			1,808.40
10000699	LOC CC1 – with heating elements – handling frame for glass chips (incl. one adapter plate of your choice)			2,371.87
10001216	Additional adapter plate	390.00	390.00	390.00

6.2.2 Stand alone interfaces: olive and female Mini Luer

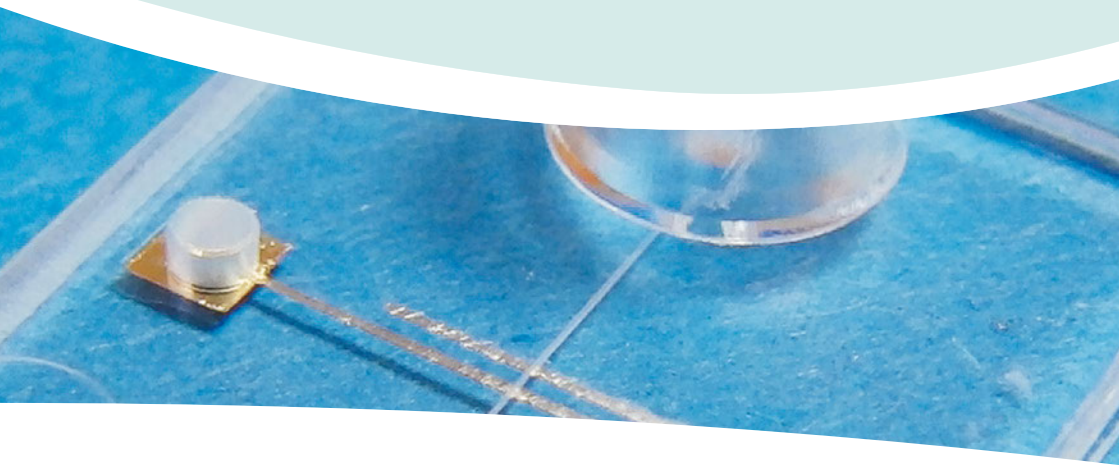
microfluidic ChipShop developed stand alone interfaces to facilitate the application of tubing on through-holes interfaces. They come in olive and female Mini Luer interfaces. These stand alone interfaces can be easily glued on the chip. Please see chapter 8. for more information.







7 Silicone chips



Silicone chips

Our product range in silicone covers standard designs as well as tailor-made microfluidic devices.

The silicone parts can be delivered as silicone-only devices without a cover lid or bonded for example to glass, silicone or polymers.

If you are interested in this service, please tell us your requirements and we will provide you with a quote.

7.1 Silicone chips and mold inserts

Together with our partner *GeSiM*, we offer a system for the easy fabrication and assembly of silicone-based microfluidic chips under the brand name MicCell. These chips are pre-cast and ready to use. We also offer customized silicon molds for the casting of individual PDMS chips.

7.1.1 MicCell — PDMS Channel Plates (pre-cast)

The versatile MicCell system from our partner *GeSiM* lets you quickly create microchannel setups and run rapid prototyping experiments.

Its fluidic system is made of a silicone elastomer (polydimethylsiloxane, PDMS). Microchannel layers called PDMS Channel Plates (CPs) can be bought ready to use (pre-cast) or are made in a special casting station.
The CPs thereby consist of a PDMS cast layer and a polycarbonate body (called PC Body) containing all necessary threaded holes so that it is ready to use.The channelsystem is sealed by a coverslip (that can be plain or equipped with a microarray, nanostructures, cultured cells, etc.).

The system is easy to handle and you can reuse the entire periphery. Simply add tubes, insert the CP into the MicCell support, and place it in an inverted microscope (via an adpater plate, available for various microscopes). Plasma activation of the PDMS to seal the channel is usually not necessary.

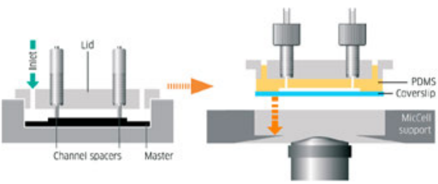


Fig. 561: Molding of the Channel Plate on a silicon master and subsequent mounting in an inverted microscope

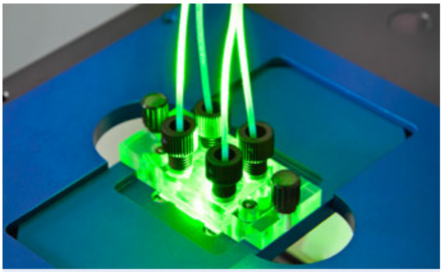


Fig. 562: MicCell consisting of PDMS Channel Plate, tubes with fittings, MicCell support and adapter plate (Work Plate).

The system is completed by other microfluidic parts and a macrofluidic environment (tubes, filters, bottles, syringes, valves, flow sensors etc.), ideally controlled by the FluidProcessor, but you can use your own devices as well. Standard MicCells can be purchased in the sizes of:

- 22 x 22 mm^2 (normal coverslip)
- 22 x 50 mm^2 (large coverslip, please inquire)
- 25 x 75 mm^2 (microscope slide size)

Different sizes allow different numbers of inlet and outlet ports, e.g. 1–2 inlets and 1–2 outlets for the 22×22 CP. The channel layout is defined by the silicon master, i.e. by you; for details see below.
Instead of casting your own gels, you can order pre-cast CPs for immediate use. The PC Body can be recycled to reduce costs. CPs from other materials (e.g. permanently bonded glass/polymer or glass/silicon microfluidic chambers) and with microelectrodes exist (inquire). Don't forget that we offer pre-assembled, ready to use multi-layer foil-based CPs, which have layer depths between 10 and 500 μm and can even contain micro/nanopore filter membranes. They also work, with slight modifications in the PC Body, in the normal MicCell.

Different channel shapes are available. The S-shape, for instance, is an unbranched channel running from one corner to the other, for shear stress or similar experiments. Other designs are available, e.g. T-junction or double-Y-shaped junction, or customized on request.


Fig. 563: Channel Plate 22 mm x 22 mm with S-shaped single channel, precast, ready to use


Fig. 564: Channel Plate 22 mm x 22 mm with double-Y-branched channel, precast, ready to use

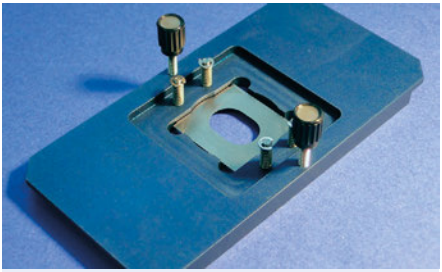


Fig. 565: MicCell support for 22x22 CPs, to be placed in an inverted microscope via an adapter plate (not shown)

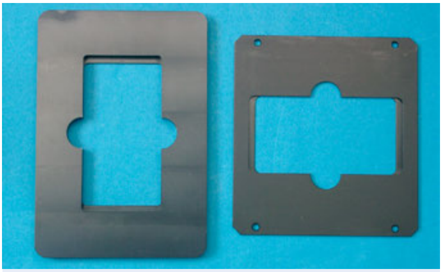


Fig. 566: Two different adapter plates (Work Plates) to mount the MicCell in a microscope, customized

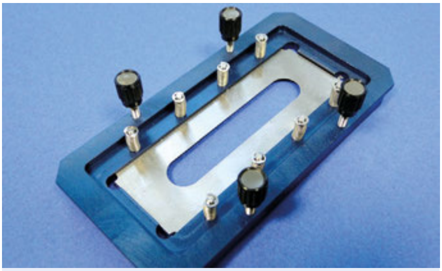


Fig. 567: MicCell support for 25x75 Channel Plate

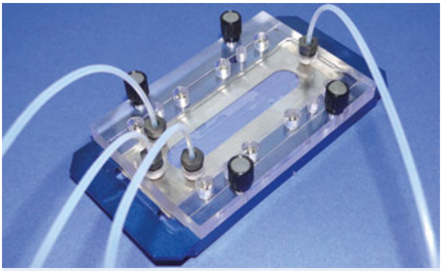


Fig. 568: Fully assembled MicCell with 25x75 Channel Plate, cross-shaped with 3 inlets and 1 outlet

Product Code	Description	Channel Design, Depth [µm]	Price [€/chip] 1+	5+	10+
10000669	PDMS-CP/22x22/S-100	S-shape, 100 µm deep	175.00	160.00	140.00
10000668	PDMS-CP/22x22/2Y-50	Double-Y-shape, 50 µm deep	175.00	160.00	140.00
10000666	PDMS-CP/25x75/Cross-50	Cross shape, 50 µm deep	300.00	270.00	240.00
10000667	MicCell support 22x22	to fix a PDMS-CP	900.00	810.00	720.00
10000663	MicCell support 25x75	to fix a PDMS-CP	900.00	810.00	720.00
10001891	MicCell Work Plate inverted	Customized for inverted microscope	220.00	200.00	180.00
10001892	MicCell Work Plate upright	Customized for upright microscope	520.00	470.00	420.00

7.1.2 MicCell gel casting

Gain flexibility by making your own Channel Plates in a *GeSiM* PDMS casting chamber. Simply place the master on the base plate, then add the Teflon cover, the PC Body, and tighten the stack with screws. Through-holes in the PDMS are created with channel spacers with their spring-loaded pins that are pushed against the master.

Silicone elastomer base and curing agent are mixed, degassed and injected. After curing, take out the Channel Plate (PC Body + PDMS layer), channel spacers and remove PDMS burs. Add a coverslip is and fix the stack with screws in the MicCell support. The channels are sealed by springs pressing the coverslip against the PDMS. Finally insert the MicCell support into the work plate of your microscope and connect tubes and other accessories to the MicCell.

Casting stations come with a technology overview and detailed hands-on instructions, PC Bodies, channel spacers and one liter of Sylgard 184 two-component PDMS solution (base and curing agent). You also need single-use glassware and syringes to prepare and inject the PDMS mixture, a pump and desiccator for degassing, and an oven for curing. An initial set of mixing glasses, syringes and needles is included in the casting station box.

A microstructured master for molding must be ordered separately. Accessories such as connectors for heaters, sensors and microelectrodes can be added.

Fig. 569: Polycarbonate (PC) body 22 mm x 22 mm

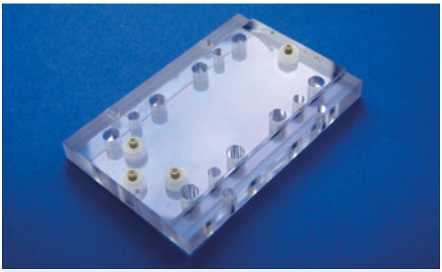


Fig. 570: Polycarbonate (PC) body 25 mm x 75 mm

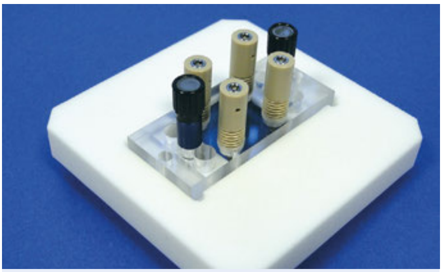


Fig. 571: Casting Station 22 mm x 22 mm. Top: assembled, including channel spacers (brown)

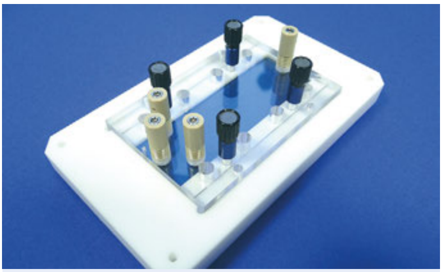


Fig. 572: Casting Station 25 mm x 75 mm

Fig. 573: Casting Station box

Product Code	Description	Design	Price [€] 1+	10+	20+
10000989	polycarbonate-body, 22 x 22 mm / 4	22 mm x 22 mm, 4 inlets 1/4-28 UNF	99.00	89.00	80.00
10000643	polycarbonate-body, 25 x 75 mm / 6	25 mm x 75 mm, 6 inlets 1/4-28 UNF	225.00	200.00	180.00
10001217	Casting station box 22 x 22 mm	casting station for 22 x 22 mm PDMS-CP, accessories*, technology description	2,390.00	2,150.00	1,900.00
10000642	Casting station box 25 x 75 mm	casting station for 25 x 75 mm PDMS-CP, accessories*, technology description	3,170.00	2,850.00	2,550.00
10001898	4″ Master, 22×22	S-T-K channel, 22×22 m	1,280.00	1,150.00	1,020.00
10001900	4″ Master, 22×22	T-channel, 22×22 mm	1,280.00	1,150.00	1,020.00
10001902	4″ Master, 22×22	2Y design, 22×22 mm	1,280.00	1,150.00	1,020.00
10001903	4″ Master, 25×75	T-Channel, 25×75 mm	1,280.00	1,150.00	1,020.00
10001218	Custom specific silicon master structure	Channel design with depth 10-50 µm, width > height	2,990.00		

* Set of PDMS-CPs, channel spacers, mixing glasses, syringes, needles

7.2 Silicon master structures

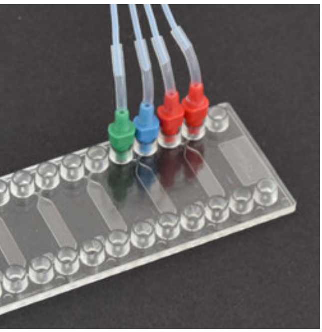
For casting of silicone *microfluidic ChipShop* offers 4 inch (100 mm diameter) silicon wafer. The wafer can be ordered with 1 – 3 channel depth differing in pricing.
You pay for a full batch of diced masters that fit on a 4-inch wafer. Masters are deep etched (reactive ion etching, RIE), can have different resolutions (25 µm with photo-emulsion mask, 2 µm with chrome mask) and are coated with PTFE (Teflon) for easy demolding.

Following design rules need to be considered:

- Wafer size: 4 inch (100 mm)
- Wafer thickness: 700 µm
- Minimum feature size: 10 µm, less upon request at extra cost
- Structure depth: 10-500 µm
- Maximum aspect ratio: <1

CAD files need to be delivered in the following format: dwg, dxf

Product Code	Description	Price [€/unit] 1+	3+	10+
10001219	One structure depth	2,750.00	2,500.00	2,200.00
10001220	Two structure depths	6,580.00	5,900.00	5,250.00
10001221	Three structure depths	11,459.00	10,350.00	9,200.00



8 Accessories

Accessories

With the help of our *Lab-on-a-Chip Catalogue*, it is our aim to ensure that you have all the necessary equipment for an easy and immediate start with our microfluidic products. This includes not only our wide variety of off-the-shelf microfluidic chips but also all accessories required to run microfluidic chips, such as fluidic interfaces, tubings, complete accessory kits, and special reagents.

If you have any additional wishes that might help you with your microfluidic work, please do not hesitate to contact us.

8. Fluidic interfaces

The use of lab-on-a-chip devices routinely requires interfaces between the chip and the macroscopic world. Our fluidic interfaces enable easy and well-proven chip-to-world interfacing.

Material matters: We offer the fluidic interfaces and plugs in different materials. Whereas PP is a harder material that is easy to use for interfacing with tubes, TPE as soft material allows for an easy closing of the interfaces without applying much pressure. Whilst too heavy forces applied by the user himself on the PP interfaces can damage the chip, the TPE interfaces will withstand such handling.

8.1 Fluidic interfaces for Mini Luer

8.1.1 Male Mini Luer fluid connectors

In order to cope with minimized footprints, a merger of the miniaturization with well-proven fluidic interfaces from the medical world has been realized, resulting in our Mini Luer connectors. These allow *microfluidic ChipShop*'s Mini Luer fluidic platforms to connect with tubes or, integrated in an instrument, directly with the instrument.

The male Mini Luer fluid connectors are the means to connect female Mini Luer platforms with tubing to connect for example pumps, valves, or waste reservoirs. They are offered as single interfaces, twins, or as rows of four. Furthermore, they are available in different colors for an easy differentiation between different liquids going in and out of the chip.

Male Mini Luer connectors have a dead volume of approximately 8 µl.

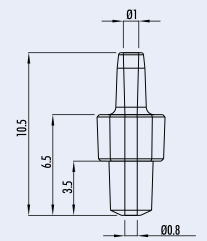


Fig. 574: Schematic drawing of a Mini Luer connector

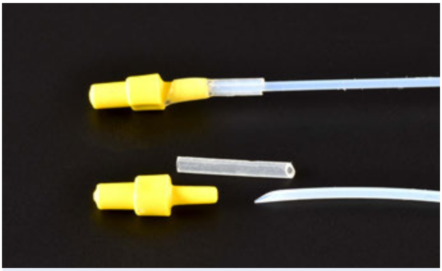


Fig. 575: Assembly of a mini Luer connector with silicone sleeve and PTFE tubing

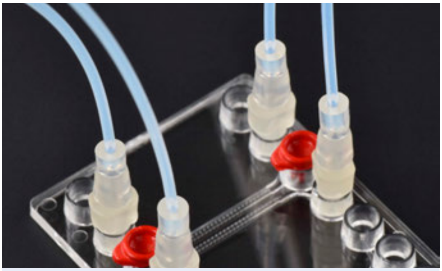


Fig. 576: Four Mini Luer connectors (transparent) with attached tubing mounted on a chip

Fig. 577: Single (green), twin (yellow) and row of four (red) Mini Luer connectors mounted on a chip with Mini Luer interfaces

Product Code	Connector Type	Material	Color	Price [€/10 pieces] 1+	5+	10+	20+
10000094	Single	PP	Opaque	19.00	14.00	9.40	7.40
10000095	Single	PP	Yellow	19.00	14.00	9.40	7.40
10000064	Single	PP	Red	19.00	14.00	9.40	7.40
10000029	Single	PP	Green	19.00	14.00	9.40	7.40
10000096	Single	PP	Blue	19.00	14.00	9.40	7.40
10000097	Single	PP	Black	19.00	14.00	9.40	7.40
10000425	Twin	PP	Opaque	19.00	14.00	9.40	7.40
10000370	Twin	PP	Yellow	19.00	14.00	9.40	7.40
10000460	Twin	PP	Red	19.00	14.00	9.40	7.40
10000409	Twin	PP	Green	19.00	14.00	9.40	7.40
10000670	Twin	PP	Blue	19.00	14.00	9.40	7.40
10000671	Twin	PP	Black	19.00	14.00	9.40	7.40
10000321	Row of four	PP	Opaque	19.00	14.00	9.40	7.40
10000305	Row of four	PP	Yellow	19.00	14.00	9.40	7.40
10000416	Row of four	PP	Red	19.00	14.00	9.40	7.40
10000461	Row of four	PP	Green	19.00	14.00	9.40	7.40
10000551	Row of four	PP	Blue	19.00	14.00	9.40	7.40
10000672	Row of four	PP	Black	19.00	14.00	9.40	7.40
10000116	Single	TPE	Opaque	19.00	14.00	9.40	7.40
10000117	Twin	TPE	Opaque	19.00	14.00	9.40	7.40
10000118	Row of four	TPE	Opaque	19.00	14.00	9.40	7.40

8.1.2 Male Mini Luer tube tuck connectors

The male Mini Luer tube tuck connector can be used to insert tubing directly into the connector and enable connection to tubing quickly and easily. The Mini Luer tube tuck connector is available for tubing with OD of 1/16“ or 1/32“. We recommend the use of PEEK capillary tubing. This combination will withstand at least 3.2 bar applied pressure without the occurrence of leakages.

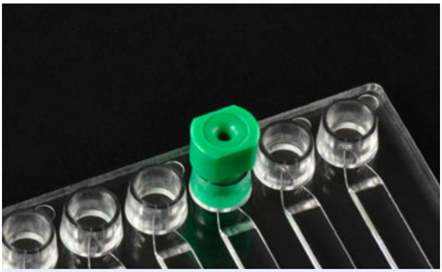


Fig. 578: Mini Luer tube tuck connector for 1/32“ OD tubing inserted into a Mini Luer interface

Fig. 579: Mini Luer tube tuck connector for 1/16“ OD tubing connected to PEEK tubing on a chip with Mini Luer interfaces

Product Code	Fluidic	Description	Connector Type	Material	Color	Price [€/10 pieces] 1+	5+	10+	20+
10001764	997	Mini Luer tube tuck connector for 1/32“ tubing	Single	TPE	Green	19.00	14.00	9.40	7.40
10001765	997	Mini Luer tube tuck connector for 1/32“ tubing	Single	TPE	Yellow	19.00	14.00	9.40	7.40
10002010	1579	Mini Luer tube tuck connector for 1/16“ tubing	Single	TPE	Blue	19.00	14.00	9.40	7.40

8.1.3 Male Mini Luer plugs

The male Mini Luer plugs are the means to close the female Mini Luer interfaces on our fluidic platforms. As the Mini Luer fluid connectors, they are offered as single units, twins, or as rows of four. Furthermore, they are available in different colors for an easy differentiation between different input and output ports. They are offered in a hard polymer (PP) and a soft polymer (TPE).

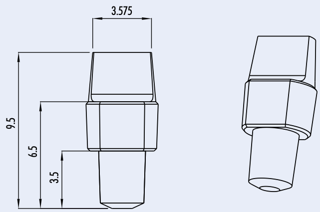


Fig. 580: Schematic drawing of a Mini Luer plug

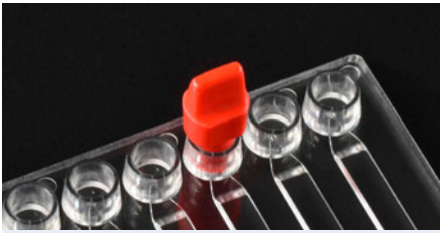


Fig. 581: Single Mini Luer plug mounted on chip

Product Code	Plug Type	Material	Color	Price [€/10 pieces] 1+	5+	10+	20+
10000030	Single	PP	Opaque	19.00	14.00	9.40	7.40
10000053	Single	PP	Red	19.00	14.00	9.40	7.40
10000052	Single	PP	Green	19.00	14.00	9.40	7.40
10000179	Twin	PP	Opaque	19.00	14.00	9.40	7.40
10000180	Twin	PP	Red	19.00	14.00	9.40	7.40
10000181	Twin	PP	Green	19.00	14.00	9.40	7.40
10000345	Row of four	PP	Opaque	19.00	14.00	9.40	7.40
10000378	Row of four	PP	Red	19.00	14.00	9.40	7.40
10000055	Row of four	PP	Green	19.00	14.00	9.40	7.40
10000054	Single	TPE	Opaque	19.00	14.00	9.40	7.40
10000119	Twin	TPE	Opaque	19.00	14.00	9.40	7.40
10000056	Row of four	TPE	Opaque	19.00	14.00	9.40	7.40

8.1.4 Two-wing male Mini Luer plugs – Low volume displacement

These special male Mini Luer plugs are designed to fit female Mini Luer interfaces. As they only seal the through hole at the bottom of the interface, liquid movement is avoided due to minimal air or liquid displacement.

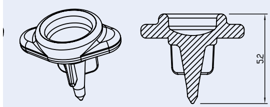


Fig. 582: Schematic drawing Mini Luer low volume displacement plug

Fig. 583: Mini Luer low volume displacement plug

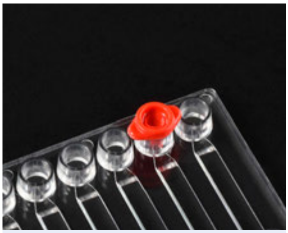


Fig. 584: Mini Luer low volume displacement plug mounted on chip

Product Code for Fluidic 438	Plug Type	Material	Color	Price [€/10 pieces] 1+	5+	10+	20+
10000280	Single	PP	Red	19.00	14.00	9.40	7.40
10000205	Single	TPE	Opaque	19.00	14.00	9.40	7.40
10001291	Single	TPE	Green	19.00	14.00	9.40	7.40

8.1.5 One-wing male Mini Luer plugs – Low volume displacement

The one-wing version of the male Mini Luer low volume displacement plugs has been realized for narrow features placed on the microfluidic device. The one-wing plugs can be placed nicely in dense arrays of female Mini Luer interfaces on chip, are easy to handle and close safely the matching counterpart on chip.

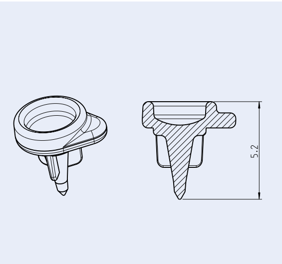


Fig. 585: Schematic drawing of low volume displacement plug Fluidic 793

Fig. 586: Plug Fluidic 793 mounted on chip

Fig. 587: Low volume displacement plug Fluidic 1069 (row of four)

Product Code	Fluidic	Plug Type	Material	Color	Price [€/10 pieces]			
					1+	5+	10+	20+
10001067	793	Single	PP	Red	19.00	14.00	9.40	7.40
10001068	793	Single	TPE	Opaque	19.00	14.00	9.40	7.40
10001105	793	Single	TPE	Red	19.00	14.00	9.40	7.40
10001986	1069	Row of four	TPE	Opaque	19.00	14.00	9.40	7.40

8.1.6 Mini Luer cap

The Mini Luer cap is the perfect accessory for covering a Mini Luer interface in order to prevent evaporation and contamination. It features a small footprint and its design allows for easy handling and grip.

Fig. 588: The Mini Luer cap is ideal to cover Mini Luer interfaces securely

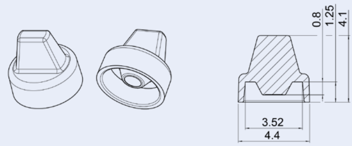


Fig. 589: Drawing of the Mini Luer cap

Product Code for Fluidic 1262	Description	Plug Type	Material	Color	Price [€/10 pieces] 1+	5+	10+	20+
10001686	Mini Luer cap	Single	TPE	Green	19.00	14.00	9.40	7.40
10001687	Mini Luer cap	Single	TPE	Yellow	19.00	14.00	9.40	7.40

8.1.7 Mini Luer flat cap

The Mini Luer flat cap enables sealing of a Mini Luer interface and at the same time features minimal footprint and adds virtually no height to the microfluidic setup.

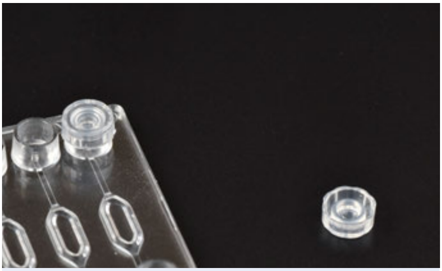


Fig. 590: The Mini Luer flat cap mounted on a Mini Luer interface (left) and as individual piece (right)

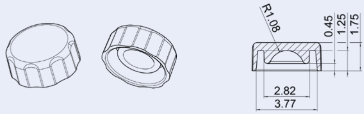


Fig. 591: Schematic drawing and measurements of Mini Luer flat cap Fluidic 1230

Product Code for Fluidic 1230	Description	Plug Type	Material	Color	Price [€/10 pieces] 1+	5+	10+	20+
10001766	Mini Luer flat cap	Single	TPE	Opaque	19.00	14.00	9.40	7.40

8.1.8 Mini Luer to pipette adapter

The Mini Luer to pipette adapters allow a flush sealing of a pipette tip to a chip equipped with a Mini Luer interfaces. This enables the realization of higher applied fluidic pressures, as well as a reduced contamination risk.

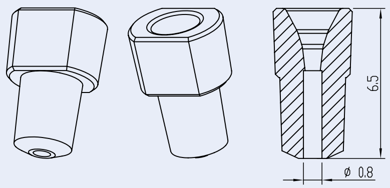


Fig. 592: Mini Luer to pipette adapter

Fig. 593: Mini Luer to pipette adapter Fluidic 391 in use with a Chamber chip

Product Code for Fluidic 391	Description	Material	Price [€/10 pieces] 1+ 10+
10000057	Mini Luer to pipette adapter	PP	19.00 9.40

8.1.9 Mini Luer to Luer adapter

The Mini Luer to Luer adapters allow the connection of devices with a standard male Luer connector (e.g. a syringe) to a chip with Mini Luer interfaces. Due to the size of the Luer connector, only every second Mini Luer port can be utilized with this adapter.

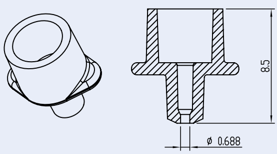


Fig. 594: Schematic drawing Mini Luer to Luer adapter

Fig. 595: Mini Luer to Luer adapter

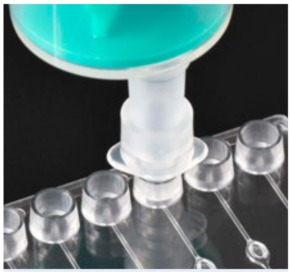


Fig. 596: Mini Luer to Luer adapter in use with a chip an 10 ml syringe

Product Code for Fluidic 390	Description	Material	Price [€/10 pieces] 1+ 10+
10000063	Mini Luer to Luer adapter	PP	19.00 9.40

8.2 Fluidic interfaces for Luer

8.2.1 Male Luer fluid connectors

Male Luer fluid connectors are the tool used to couple female Luer interfaces on fluidic platforms to tubing deriving from pumps, valves or reservoirs.

An important feature of these connectors is the massively reduced dead volume compared to conventional interfaces. This also allows for smooth pumping from the liquid reservoir to the chip without huge pressure drops due to massively different channel diameters on and off chip.

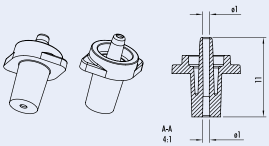


Fig. 597: Male Luer fluid connector


Fig. 598: Male Luer fluid connector with olive interface


Fig. 599: Male Luer fluid connector with olive interface mounted on chip

Product Code for Fluidic 263	Description	Price [€/10 pieces] 1+	10+
10000080	Male Luer fluid connector, opaque	25.00	14.40
10000081	Male Luer fluid connector, green	25.00	14.40

8.2.2 Male Luer tube tuck connectors

The male Luer tube tuck connector can be used to insert tubing directly into the connector and enable connection to tubing quickly and easily. The Luer tube tuck connector is available for tubing with OD of 1/16“ or 1/32“. We recommend the use of PEEK capillary tubing. This combination will withstand at least 3.2 bar applied pressure without the occurrence of leakages.

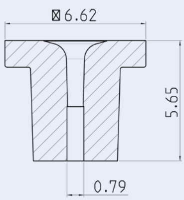


Fig. 600: Schematic drawing of male Luer tube tuck connector Fluidic 1580


Fig. 601: Male Luer tube tuck connector for 1/32“ OD tubing

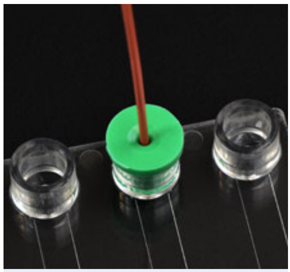


Fig. 602: Male Luer tube tuck connector with 1/32“ OD PEEK tubing

Product Code	Fluidic	Description	Connector Type	Material	Color	Price [€/10 pieces] 1+	10+
10002011	1580	Luer tube tuck connector for 1/32“ tubing	Single	TPE	Green	25.00	14.40
10002012	1581	Luer tube tuck connector for 1/16“ tubing	Single	TPE	Blue	25.00	14.40

8.2.3 Male Luer plugs

The male Luer plug Fluidic 270 enables closing of female Luer and Luer lock interfaces on our fluidic platforms. With the help of this plug, liquid can be moved with the female Luer interface into the fluidic channels on chip, and the fluidic interface itself is safely closed in order to avoid a contamination risk.

A version with retaining strip Fluidic 264 allows to directly attach the Male Luer plug to a lab-on-a-chip device with a suitable counterpart for the pin at the end of the strip. This is a convenient method to ensure an easy handling of the overall device.
Additionally, the Luer plunger Fluidic 1539 has been developed. With its textured surface and the softer PET material it provides an even better grip and hence liquid tightness.

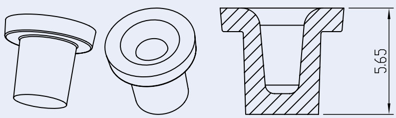


Fig. 603: Schematic drawing male Luer plug Fluidic 270

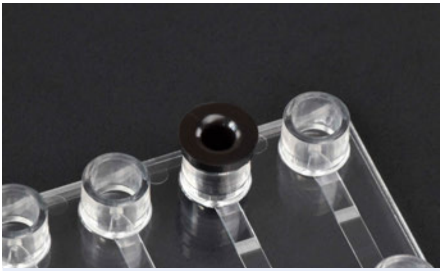


Fig. 604: Male Luer plug Fluidic 270 on chip

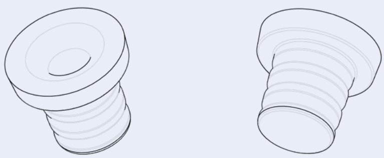


Fig. 605: Schematic drawing male Luer plunger with ripped surface Fluidic 1539

Fig. 606: Male Luer plug Fluidic 264 with rataining stripe on chip

Product Code	Description	Material	Price [€/10 pieces] 1+	10+
10000230	Male Luer plug, opaque - Fluidic 270	PP	19.00	9.40
10000231	Male Luer plug, black - Fluidic 270	PP	19.00	9.40
10000084	Male Luer plug with retaining strip, opaque - Fluidic 264	PP	25.00	14.40
10000083	Male Luer plug with retaining strip, black - Fluidic 264	PP	25.00	14.40
10002068	Male Luer plunger with ripped surface - Fluidic 1539	TPE	19.00	9.40

8.2.4 Male Luer plugs - Low volume displacement plugs

The Luer plugs with low volume displacement have a dedicated design to displace less volume into the microfluidic system, either by having a reduced plug length (Fluidic 262) or by closing the Luer interface punctual at the very bottom (Fluidic 1223). They have been realized for narrow features placed on the microfluidic devices.

Fig. 607: Luer plug Fluidic 262 with a reduced displacement volume of only 20 μl

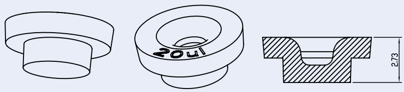


Fig. 608: Schematic drawing Luer plug with reduced displacement volume

Fig. 609: Luer plug with low volume displacement Fluidic 1223and two wings for easier handling placed on a chip

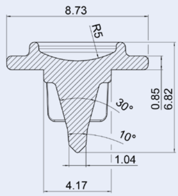


Fig. 610: Schematic drawing of male Luer plug Fluidic 1223

Product Code	Description	Fluidic	Material	Color	Price [€/10 pieces] 1+	5+	10+	20+
10000082	Male Luer plug - Low vol. displ.	262	PP	Opaque	25.00	-	14.40	-
10001592	Male Luer plug - Low vol. displ.	1223	PP	Red	19.00	14.00	9.40	7.40
10001595	Male Luer plug - Low vol. displ.	1223	TPE	Opaque	19.00	14.00	9.40	7.40

8.2.5 Luer flat cap

The Luer flat cap enables sealing of a Luer interface and at the same time features minimal footprint and adds virtually no height to the microfluidic setup.

Fig. 611: Luer flat cap Fluidic 1231 placed on a chip

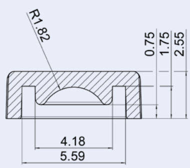


Fig. 612: Schematic drawing of the Luer flat cap Fluidic 1231

Product Code for Fluidic 1231	Description	Plug Type	Material	Color	Price [€/10 pieces] 1+	5+	10+	20+
10001767	Luer flat cap	Single	TPE	Opaque	19.00	14.00	9.40	7.40

8.3 Fluidic interfaces for pipetting interface

8.3.1 Pipetting interface plug

The male pipetting interface plugs Fluidic 1225 and Fluidic 1236 are used to close female pipetting interfaces on our fluidic platforms. The pipetting interface simplifies direct pipetting into the microfluidic chips.

The pipetting interface plug Fluidic 1236 only seals the through-hole at the bottom of the interface and prevents liquid movement, due to minimal air or liquid displacement. Both pipetting interface plugs fit well into the chamber chip with pipetting interface Fluidic 1495.

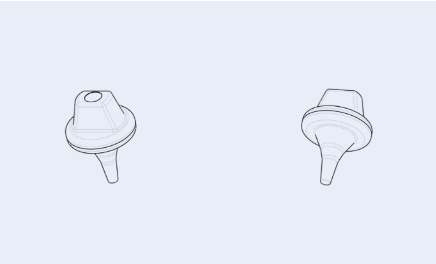


Fig. 613: Schematic drawing of pipetting interface plug Fluidic 1225

Fig. 614: Pipetting interface plug Fluidic 1225

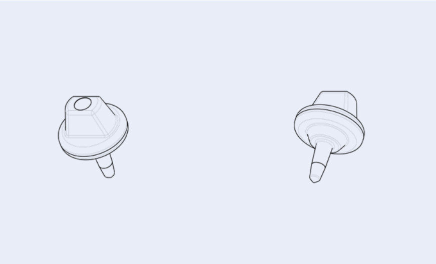


Fig. 615: Schematic drawing of pipetting interface plug Fluidic 1236

Fig. 616: Pipetting interface plug Fluidic 1236 mounted on chip

Product Code	Description	Material	Color	Price [€/10 pieces] 1+	5+	10+	20+
10001579	Pipetting interface plug Fl.1225	PP	Opaque	19.00	14.00	9.40	7.40
10001578	Pipetting interface plug - low volume displacement Fl.1236	PP	Yellow	19.00	14.00	9.40	7.40
10001584	Pipetting interface plug - low volume displacement Fl.1236	PP	Green	19.00	14.00	9.40	7.40
10001585	Pipetting interface plug - low volume displacement Fl.1236	PP	Red	19.00	14.00	9.40	7.40
10001586	Pipetting interface plug - low volume displacement Fl.1236	TPE	Yellow	19.00	14.00	9.40	7.40
10001587	Pipetting interface plug - low volume displacement Fl.1236	TPE	Green	19.00	14.00	9.40	7.40

8.4 Syringe adapter

The syringe adapter can be used to connect any standard laboratory syringe with male Luer interface to tubing. Each syringe adapter has a length of 55 mm, an tip inner diameter of 0.5 mm and an outer diameter of 1.7 mmm. This product can be ordered as single item or in packs of 50 items.

Fig. 617: Syringe adapter connected to a 1 ml syringe

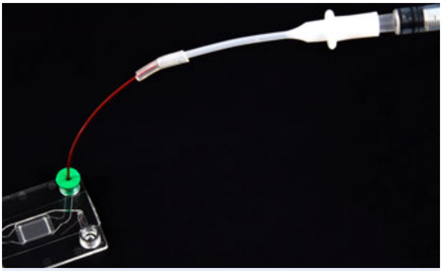


Fig. 618: Syringe adapter interconnecting an 1 ml syringe, via microfluidic tubing and tube tuck connector Fl. 997, to a chip

Product Code	Description	Material	Price [€]
10000614	Syringe adapter; 1 piece	PP	2.50
10002008	Syringe adapters; pack of 50 pieces	PP	76.00

8.5 Stand alone fluidic interfaces

8.5.1 *microfluidic ChipShop's* short female Luer compatible connector

The short female stand-alone Luer connectors are devices for chip prototyping. The stand-alone interface features a large footprint for easy assembly and gluing to protoytpe devices with simple through hole interfaces. The connectors can be glued on prototyp chips made from polymer, glass or silicone.

The shortened stand-alone Luer adapter has a reduced height and is **identical to *microfluidic ChipShop's* Luer interface**. Hence, it is compatible with all of our available Luer connectors, plugs, and tanks.

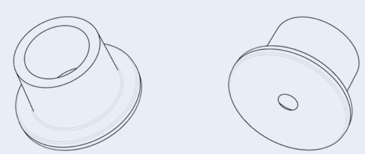


Fig. 619: Schematic drawing of short female Luer compatible connectors with wide base

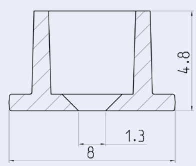


Fig. 620: Detail of the short female Luer compatible connectors with wide base

Product Code for Fluidic 1605	Material	Price [€/10 pieces] 1+	5+	10+	20+
10002029	PMMA	30.00	25.00	20.00	15.00
10002030	Topas	30.00	25.00	20.00	15.00
10002031	PC	30.00	25.00	20.00	15.00

The short female Luer compatible connectors with wide base can be fixed on the microfluidic chip either by applying glue or using a double sided adhesive tape cut-out. Such adhesive rings can be ordered in connection with the fluidic interfaces.

Product Code	Description	Price [€/unit] – 1 unit = 10 adhesive rings 1+	10+
10000716	Adhesive ring Fluidic 698 - for short female Luer compatible interface wide base (Fluidic 1065)	18.40	7.89

8.5.2 Female Luer lock compatible connectors

The female Luer lock compatible connectors are tools for chip prototyping. They are compatible with male Luer lock adapters, e.g. as used for standard disposable syringes. The connectors can be glued on prototyp chips made from polymer, glass or silicone. The diameter of the through hole is 1.3 mm.

Please note: The connectors are not compatible with all of *microfluidic ChipShop's* Luer accessories. Not sure what to choose? Please reach out to inquiries@microfluidic-ChipShop and we will be happy to recommend you a matching combination.

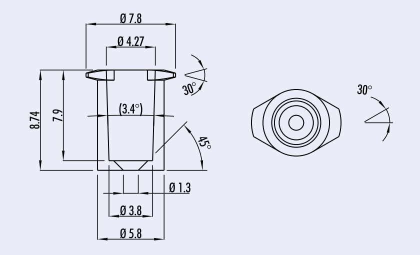


Fig 621: Schematic drawing of Luer lock compatible adapter


Fig. 622: Female Luer lock connector with straight walls

Product Code for Fluidic 302	Material	Price [€/10 pieces] 1+	5+	10+	20+
10000227	PMMA	30.00	25.00	20.00	15.00
10000228	Topas	30.00	25.00	20.00	15.00
10000229	PC	30.00	25.00	20.00	15.00

The female Luer lock compatible connectors can be fixed on the microfluidic chip either by applying glue or using a double sided adhesive tape cut-out. Such adhesive rings can be ordered in connection with the fluidic interfaces.

Product Code	Description	Price [€/unit] – 1 unit = 10 adhesive rings 1+	10+
10000715	Adhesive ring Fluidic 697 - for female Luer lock compatible interface (Fluidic 302)	18.40	7.89

8.5.3 Female Luer lock compatible connectors with wide base

The female stand-alone Luer lock connectors with wide base possess a larger footprint for easier assembly and gluing, compared to the standard with straight walls (Fluidic 302).

Please note: The connectors are not compatible with all of *microfluidic ChipShop's* Luer accessories. Not sure what to choose? Please reach out to inquiries@microfluidic-ChipShop and we will be happy to recommend you a matching combination.

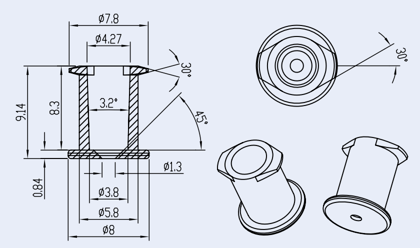


Fig. 623: Schematic drawing of female Luer lock compatible connectors with wide base


Fig. 624: Female Luer lock connector with wide base - Fluidic 303

Product Code for Fluidic 303	Material	Price [€/10 pieces] 1+	5+	10+	20+
10000013	PMMA	30.00	25.00	20.00	15.00
10000014	Topas	30.00	25.00	20.00	15.00
10000015	PC	30.00	25.00	20.00	15.00

The female Luer lock compatible connectors with wide base can be fixed on the microfluidic chip either by applying glue or using a double sided adhesive tape. Such adhesive rings can be ordered in connection with the fluidic interfaces.

Product Code	Description	Price [€/unit] – 1 unit = 10 adhesive rings 1+	10+
10000716	Adhesive ring Fluidic 698 - for female Luer lock compatible interface wide base (Fluidic 303)	18.40	7.89

8.5.4 Female Luer connector – 90° angle for horizontal operation

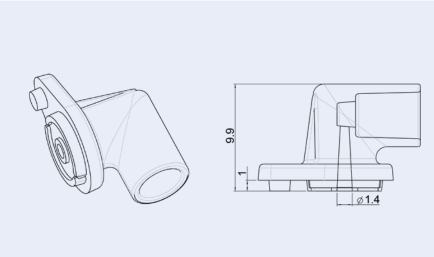


Fig. 625: Female Luer for horizontal syringe integration – schematic drawing of Fluidic 544

Fig. 626: Female Luer lock connector for horizontal syringe operation

Product Code for Fluidic 544	Description	Material	Price [€/10 pieces] 1+	5+	10+	20+
10001073	Female Luer connector - 90° angle for horizontal operation	PMMA	30.00	25.00	20.00	15.00
10001074	Female Luer connector - 90° angle for horizontal operation	Topas	30.00	25.00	20.00	15.00
10001075	Female Luer connector - 90° angle for horizontal operation	PC	30.00	25.00	20.00	15.00

8.5.5 Stand alone olive

The stand alone olive interface can be mounted on prototype devices with simple through holes and enables a direct connection to tubing, without the need of any additional adapters. The olives can be glued on prototyp chips made from polymer, glass or silicone.

Fig. 627: Stand alone olive Fluidic 630

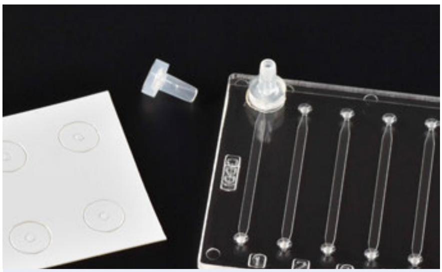


Fig. 628: Stand alone olive mounted on chip with adhesive

Product Code for Fluidic 630	Description	Material	Price [€/10 pieces] 1+	5+	10+	20+
10000700	Stand-alone olive - fluidic interface to be glued on chip	PP	19.00	14.00	9.40	7.40

The stand-alone olive fluidic interfaces can be fixed on the microfluidic chip either by applying glue or using a double sided adhesive tape cut-out. Such adhesive rings can be ordered in connection with the fluidic interfaces.

Product Code	Description	Price [€/unit] – 1 unit = 10 adhesive rings 1+	10+
10000717	Adhesive ring Fluidic 699 - for stand alone olive interface (Fluidic design 630)	18.40	7.89

8.5.6 Stand alone female Mini Luer

The stand alone feamale Mini Luer interface can be mounted on prototype devices with through-hole interface. The Mini Luer interface offers, next to a small footprint, also a high versatility and reduced footprint compared to the Luer interface.
The stand alone Mini Luer interface is **identical to *microfluidic ChipShop's* Mini Luer interface**. Hence, it is compatible with all of our available Mini Luer connectors, plugs and tanks.

Fig. 629: Stand alone Mini Luer Fluidic 631

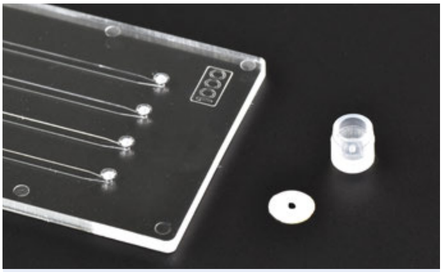


Fig. 630: Stand alone Mini Luer next to a chip with through hole interfaces and with matching adhesive tape

Product Code for Fluidic 631	Description	Material	Price [€/10 pieces] 1+	5+	10+	20+
10000701	Stand-alone female Mini Luer - fluidic interface to be glued on chip	PP	19.00	14.00	9.40	7.40

The female Mini Luer interfaces can be fixed on the microfluidic chip either by applying glue or using a double sided adhesive tape cut-out. Such adhesive rings can be ordered in connection with the fluidic interfaces.

Product Code	Description	Price [€/unit] – 1 unit = 10 adhesive rings 1+	10+
10000717	Adhesive ring Fluidic 699 - for stand alone female Mini Luer interface (Fluidic design 631)	18.40	7.89

8.5.7 NanoPort Assembly

Our NanoPort Assembly will readily connect 1/16″ OD tubing with the included fittings. To connect 1/32″ OD or 360 μm OD, tubing sleeves for each size are included in each assembly.

Adhesive is not included in the N-333 NanoPort Assembly. Please be advised that the footprint of the NanoPort is 8.4 mm.

Fig. 631: NanoPorts Assembly family

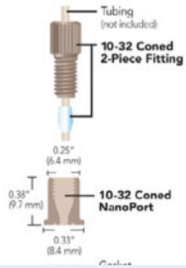


Fig. 632: N-333 NanoPort

Product Code	Comment	Price [€/piece] 1+	10+
10000972	N-333 NanoPort	42.20	37.10

8.5.8 LabSmith CapTite™ components for fluidic interfaces

CapTite components are designed for high-pressure and low dead volumes. They can be used on microfluidic chips containing simple holes as access ports such as the straight channel chips in chapter 3.2.1.1 or cross-shaped channel chips in chapter 3.5.1.1. They can be interfaced directly with LabSmith's hardware such as syringe pumps and valves (for hardware details see www.labsmith.com). An example of a cross-shaped channel chip with three bonded port connectors and three chip reservoirs is shown below. A choice of different components is available allowing for various connection options. This includes:

- **Bonded port connectors:** Bonds to port on chip for capillary-chip interface. Compatible with approx. 1 mm port size. Material: Ultem
- **Chip reservoir:** Threads into bonded port connector to provide 85 μl fluid reservoir. Also connects to Luer tip syringe for low pressure connection.
- **Luer lock adapter:** Female fitting for connecting syringe to 360 μm OD capillary. Material: PEEK.
- **One piece fitting:** For connecting 360 μm OD capillary to CapTite components. Material: PEEK.
- **One piece plug:** For plugging unused CapTite ports. Material: PEEK.
- **Complete LabSmith connection kit:** The kit contains besides 15 **bonded port connectors**, 15 **one piece fittings**, 5 **one piece plugs**, 5 **chip reservoirs** and 2 **Luer lock adapters** all accessories needed to mount the devices on a chip such as **epoxy adhesive** and a **wrench** for the CapTite connectors as well as **360 μm OD capillary** to connect the chip to peripherals.
- **Cross-shaped channel chips** with integrated threads.

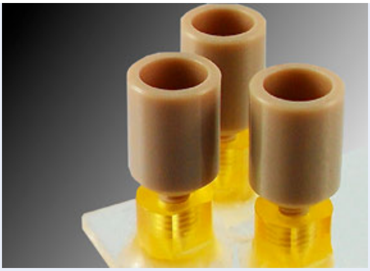


Fig. 633: Cross-shaped channel chip with three bonded port connectors and three chip reservoirs

Fig. 634: Bonded port connector

Fig. 635: Female Luer lock adapter

Fig. 636: One piece plug (left) and one piece fitting (right)

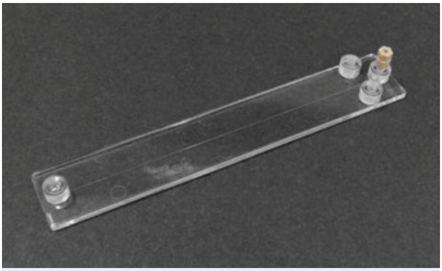


Fig. 637: Cross-shaped channel chips with embedded threads to connect with LabSmith's one piece fittings

Product Code	Description	Material	Price [€] 1+	10+
10000391	Bonded Port Connector	Ultem	9.50	8.95
10000909	Chip Reservoir	PEEK	10.90	9.90
10000315	Luer lock Adapter	PEEK	29.00	26.00
10000404	One piece fitting	PEEK	10.90	9.90
10000418	One piece plug	PEEK	8.50	7.90
10000698	Complete LabSmith connection kit. Contains 15 bonded port connectors, 15 one piece fittings, 5 one piece plugs, 5 chip reservoirs, 2 Luer-Lock adapters, 1 m 360 μm OD PEEK capillary, 12 ml epoxy adhesive, 1/8" hex wrench		470.00	425.00
10001829	Cross-shaped channel chip with threads in the fluidic interface to connect with LabSmith one piece fitting (10000404)	PMMA	62.40	43.60

8.6 Liquid storage

One issue that often occurs with microfluidics is the storage of liquid reagents on chip. This frequently conflicts with either dry-stored reagents on the chip, the available space, or the volume of the liquid. *microfluidic ChipShop* has developed several solutions to deal with this issue, including our so-called "tank" solution, as well as blister pouches.

Fig. 638: Tanks mounted on a microfluidic chip

Fig. 639: Blister pouches of different volumes integrated in a complex microfluidic chip

8.6.1 Tanks

The "tank" solution allows the storage of liquids in separate tanks, which are simply plugged onto the chip. The openings can be sealed with a heat-sealing aluminum foil, which is piercable. Liquid actuation can also be done via tanks either by a mechanical piston or pneumatic pressure.
Tanks are provided either with on open top or can be closed with an attached cap. The cap can possess various features, such as a Mini Luer interface for pneumatic actuation or an integrated venting membrane. Below an overview of available tanks and their most important features is given.

Fluidic Design	Volume [µl]	Tank Format	Tank to Chip Interface Type	Cap	Design Feature
933	200	Single	Luer	Yes	-
934	200	Single	Luer	Yes	Mini Luer interface in cap
833	200	Single	Luer	Yes	Venting cap
926	200	Single	Mini Luer	Yes	-
387	500	Single	Luer	No	-
388	500	Double	Luer	No	-
389	500	Triple	Luer	No	-
823	500	Single	Luer	No	Large opening
824	500	Double	Luer	No	Large opening
825	500	Triple	Luer	No	Large opening
229	500	Single	Piercing interface	No	-
230	500	Double	Piercing interface	No	-
231	500	Triple	Piercing interface	No	-
639/1548	500	Single	Luer	Yes	Mini Luer interf. in cap; venting membrane opt.
603	1000	Row of four	Luer	No	-
232	4500	Row of four	Luer	No	-
233	4500	Row of four	Luer	Yes	Mini Luer interface in cap
234	4500	Row of four	Large interaction	No	-
235	4500	Row of four	Large interaction	Yes	Mini Luer interface in cap
1110	4500	Single	Large interaction	No	-
569	539	Single	Luer	No	Compatible with commercial pipette
275	6500	Single	Luer	Yes	-
276	6500	Single	Luer	Yes	Integrated septum in Luer interface

8.6.1.1 Tank 200 µl with cap

This tank version with a volume of 200 µl can be closed with a cap. With its embedded Luer interface, the tank can be easily mounted on chip.

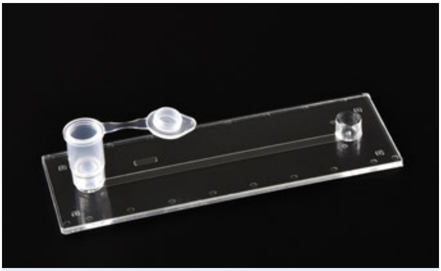


Fig. 640: Tank Fluidic 933 mounted on chip with Luer interface

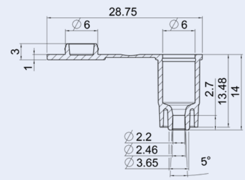


Fig. 641: Detail drawing of tank Fluidic 933 with Luer interface

Product Code for Fluidic 933	Description	Material	Price [€/10 pieces] 1+	10+	100+
10001094	200 µl tank with cap	PP	25.00	10.20	5.40
10001095	200 µl tank with cap	PP - black	25.00	10.20	5.40

8.6.1.2 Tank 200 µl with Mini Luer interface cap

Being similar in design, this tank also holds a volume of 200 µl and possesses a Luer interface, like tank Fluidic 933. Additionally, tank Fluidic 934 is equipped with a Mini Luer interface in its cap. This enables easy liquid or air pressure supply.

Fig. 642: Schematic drawing of tank Fluidic 934

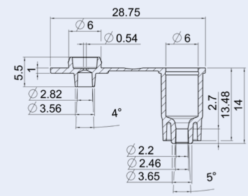


Fig. 643: Detail drawing of tank Fluidic 934 with Luer interface

Product Code for Fluidic 934	Description	Material	Price [€/10 pieces] 1+	10+	100+
10001096	200 µl tank with Mini Luer cap	PP	25.00	10.20	5.40
10001097	200 µl tank with Mini Luer cap	PP - black	25.00	10.20	5.40

8.6.1.3 Tank 200 µl with cap with venting function

With its Luer interface this 200 µl tank can be easily mounted on chip. This tank for venting purposes is available in two different versions: one version possessing a venting hole in its lid, while the other one is equipped with an additional venting membrane.

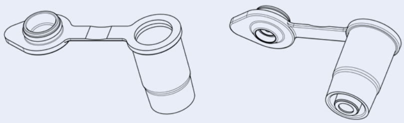


Fig. 644: Schematic drawing of tank Fluidic 833

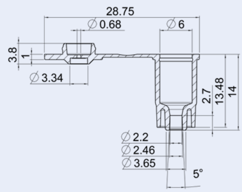


Fig. 645: Detail drawing of tank Fluidic 833 with cap for venting purposes

Product Code for Fluidic 833	Description	Material	Price [€/10 pieces] 1+	10+	100+
10000991	200 µl tank with venting-cap – Fluidic 833	PP	25.00	10.20	5.40
10001076	200 µl tank with vening cap incl. venting memb-rane – Fluidic 833	PP	40.00	25.20	9.40

8.6.1.4 Tank 200 µl with Mini Luer interface

With its male Mini Luer interface, this tank can be mounted on many of our standard microfluidic chips that feature Mini Luer interfaces. The tank can hold up to 200 µl and has two male Mini Luer interfaces for a stable mounting performance. However, please note, only one interface is serving liquid supply, while the other solely enhances mounting stability.

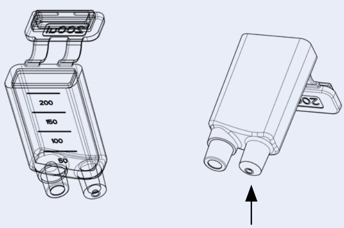


Fig. 646: Schematic drawing of 200 µl tank Fluidic 926. The functional Mini Luer interface is marked with an arrow.

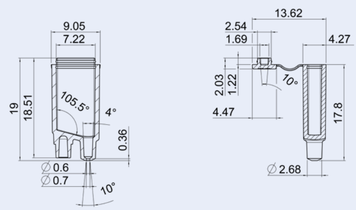


Fig. 647: Detail drawing of tank Fluidic 926 with Mini Luer interfaces for easy on-chip fitting

Fig. 648: 200 µl tank Fluidic 926

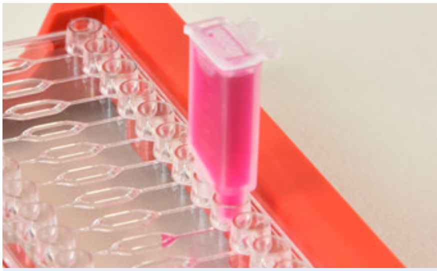


Fig. 649: The 200 µl tank Fluidic 926 can be easily mounted on chip with its Mini Luer interfaces

Product Code for Fluidic 926	Description	Material	Price [€/10 pieces] 1+	10+	100+
10001315	200 µl tank with Mini Luer interface	PP	25.00	10.20	5.40

8.6.1.5 Tank 500 µl with Luer interface

This tank version with a tank volume of 500 µl has a male Luer interface to connect to any chip with a female Luer port. If the tank has sealed output, the chip has to have a piercing element to breach the sealing film. The 500 µl Luer tank is available in a single, double or triple tank version.

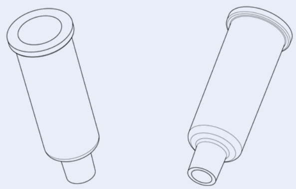


Fig. 650: 500 µl single tank Fluidic 387 with Luer interface

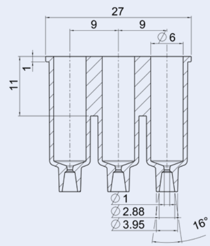


Fig. 651: 500 µl triple tank with Luer interface

Fig. 652: 500 µl triple tanks versions - single, double, triple

Fig. 653: 500 µl single tank (black) mounted on Luer interface

Product Code	Fluidic	Description	Material	Price [€/10 pieces] 1+	10+	100+
10000281	387	Single tank Luer interface	PP	25.00	10.20	5.40
10000282	388	Double tank Luer interface	PP	26.00	11.80	5.80
10000283	389	Triple tank Luer interface	PP	27.00	12.40	6.10
10000431	387	Single tank Luer interface - black	PP - black	25.50	10.70	5.90
10000612	388	Double tank Luer interface - black	PP - black	26.50	12.30	6.30
10000613	389	Triple tank Luer interface - black	PP - black	27.50	12.90	6.60

8.6.1.6 Tank 500 µl with Luer interface – Large opening

This tank version with a tank volume of 500 µl has a male Luer interface to connect to any chip with a female Luer port. If the tank has sealed output, the chip has to have a piercing element to breach the sealing film. The 500 µl Luer tank is available in a single, double or triple tank version.

The large opening at the interface to the microfluidic chip allows a nice liquid supply and minimizes diameter changes in the liquid column in the tank.

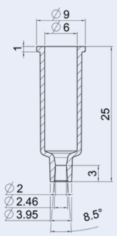


Fig. 654: Schematic drawing of single tank Fluidic 823

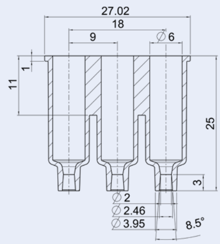


Fig. 655: 500 µl Schematic drawing of triple tank Fluidic 825

Product Code	Description	Material	Price [€/10 pieces] 1+	10+	100+
10000960	Single tank Luer interface – large opening – Fluidic 823	PP	25.00	10.20	5.40
10000977	Double tank Luer interface – large opening – Fluidic 824	PP	26.00	11.80	5.80
10000978	Triple tank Luer interface – large opening – Fluidic 825	PP	27.00	12.40	6.10
10000993	Single tank Luer interface – large opening – Fluidic 823 - black	PP	25.50	10.70	5.90
10000994	Double tank Luer interface – large opening – Fluidic 824 - black	PP	26.50	12.30	6.30
10000995	Triple tank Luer interface – large opening – Fluidic 825 - black	PP	27.50	12.90	6.60

8.6.1.7 Tank 500 µl with piercing interface

This tank version, which exists in single, double, and triple tank versions, has a volume of 500 µl and is 25 mm high. The sealed tank is clipped onto a chip, which has to have a suitable piercing interface to pierce the sealing film.

Fig. 656: Single, double, and triple tank

Fig. 657: Filled tanks sealed with alumina foil

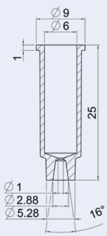


Fig. 658: Single tank Fluidic 229 with interface for piercing applications

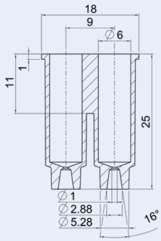


Fig. 659: Double tank Fluidic 230

Product Code	Fluidic	Description	Material	Price [€/10 pieces] 1+	10+	100+
10000102	229	Single tank piercing interface	PP	25.00	10.20	5.40
10000103	230	Double tank piercing interface	PP	26.00	11.80	5.80
10000104	231	Triple tank piercing interface	PP	27.00	12.40	6.10

8.6.1.8 Tank 500 μl with cap with Mini Luer interface

This tank version with a volume of 500 μl can be closed with a cap having a Mini Luer interface either for liquid or air pressure supply or for venting purposes. Furthermore, the cap can be equipped with a venting membrane in the Mini Luer interface allowing for a gas, but no liquid exchange. Possessing a male Luer interface, the tank can be easily mounted on chip.
It is available in two version, while Fluidic 639 has a simple base port, Fluidic 1548 has a double wall at the base to stabilize its position on the chip even more.

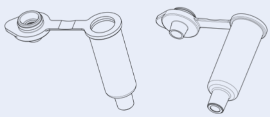


Fig. 660: Schematic drawing of tank Fluidic 639

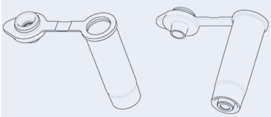


Fig. 661: Schematic drawing of tank Fluidic 1548 with double-walled base

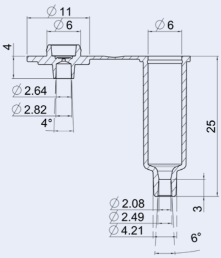


Fig. 662: Detail drawing of tank Fluidic 639 with Luer interface and cap

Product Code	Fluidic	Description	Color	Material	Price [€/10 pieces] 1+	10+	100+
10000761	639	tank with Mini Luer cap	Transparent	PP	25.00	10.20	5.40
10000697	639	tank with venting membrane in cap	Transparent	PP	40.00	25.20	9.50
10000766	639	tank with Mini Luer cap	Black	PP	25.00	10.20	5.40
10002021	1548	double-walled tank with Mini Luer cap	Transparent	PP	25.00	10.20	5.40
10002022	1548	double-walled tank with ven. membrane in cap	Transparent	PP	40.00	25.20	9.50

8.6.1.9 Tank 1 ml – Row of four with Luer interface

A larger tank version was created in order to allow for liquid storage up to 1 ml. This tank is offered as pure reservoir without a cap. The fluidic interface is realized as male Luer connector.

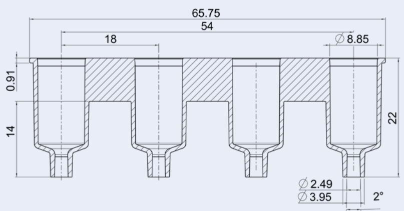


Fig. 663: 1 ml Tank with Luer interface – Fluidic 603

Fig. 664: 1 ml Tank with Luer interface mounted on microtiter plate for hydrostatic fluid management

Product Code for Fluidic 603	Description	Material	Price [€/10 pieces] 1+	10+	100+
10000754	Tank 1 ml – Row of four with Luer interface – green	PP	32.00	18.50	8.50
10000755	Tank 1 ml – Row of four with Luer interface – red	PP	32.00	18.50	8.50

8.6.1.10 Tank 4.5 ml - Row of four with Luer interface

A larger tank version was created in order to allow for liquid storage up to 4.5 ml. This tank is offered as pure reservoir or with a cap allowing for a pneumatic actuation of the fluids. The fluidic interface is realized as male Luer connector.

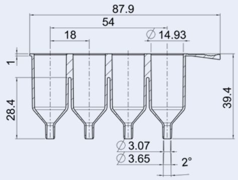


Fig. 665: Schematic drawing of row of four tanks Fluidic 232

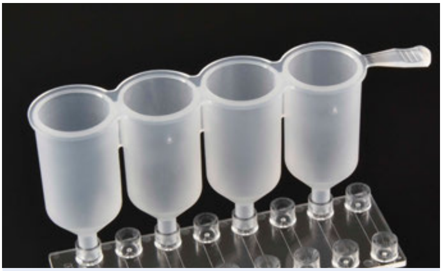


Fig. 666: Liquid reservoir Fluidic 232 with 4.5 ml volume each

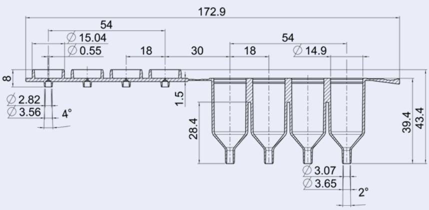


Fig. 667: Schematic drawing of tank Fluidic 233 with cap for pneumatic actuation

Fig. 668: Tank Fluidic 233 with cap for pneumatic actuation

Product Code	Fluidic	Description	Material	Price [€/10 pieces] 1+	10+	100+
10000078	232	Row of 4 tanks	PP	35.00	22.00	9.40
10000079	233	Row of 4 tanks with cap	PP	38.00	25.00	11.40

8.6.1.11 Interaction Tanks – 4.5 ml

The Interaction Tanks have been designed to allow for easy liquid access, storage and exchange in lab-on-a-chip devices. In particular if larger areas like membrane should be exposed to liquids, the Interaction Tanks can be either filled manually like Fluidic 234 or with pumps like Fluidic 235 allowing for various experimental settings. These tanks can e.g. be used with our open membrane chip Fluidic 219.
Please note, when all membranes of Fluidic 219 are in use, we recommend Fluidic 235/234 - for individual usage, Fluidic 1110 is the tank of choice (Attention - 4 tanks of Fluidic 1110 can not be used at the same time with membrane chip Fluidic 219)

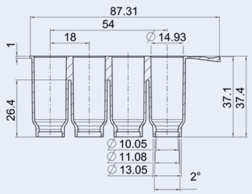


Fig. 669: Schematic drawing of Interaction Tank Fluidic 234

Fig. 670: Liquid reservoir: Interaction Tank Fluidic 234 – 4.5 ml volume mounted on a microfluidic chip

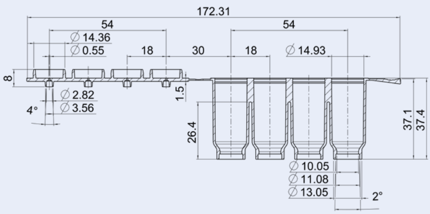


Fig. 671: Schematic drawing of Interaction Tank Fluidic 235

Fig. 672: Liquid reservoir: Interaction Tank Fluidic 235 – 4.5 ml volume mounted on a microfluidic chip

Fig. 673: Schematic drawing of interaction Tank Fluidic 1110

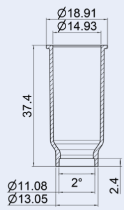


Fig. 674: Fluidic 1110 single tank with 4.5 ml

Product Code	Fluidic	Description	Material	Price [€/10 pieces] 1+	10+	100+
10000864	234	Interaction tank – row of four tanks – 4.5 ml w/o cap	PP	35.00	22.00	9.40
10000904	235	Interaction tank – row of four tanks – 4.5 ml with cap	PP	35.00	22.00	9.40
10001497	1110	Interaction tank – single tank – 4.5 ml w/o cap	PP	25.00	10.20	5.40

8.6.1.12 Sampling vessels without septum

This rather large sampling vessel allows for dry and liquid sample take up and storage on chip which is, not only in microfluidics, a critical element.
This sampling vessel has a total filling volume of 6.5 ml and can be mounted on chip via its male-Luer fluidic interface. It comes with a cap at the top which is sealed with embedded thread O-ring, ensuring a liquid tight sealing, as well as a little pressure cap at the bottom. After mounting on the chip, either liquid can be pipetted inside or a vessel, filled with buffer, can be used in which a swab is introduced after sample take up.

A sealing of these vessels at the bottom with piercable alumina foil is possible, allowing to prefill the vessels before mounting them on chip. Different kinds of alumina foil sealing are available, depending on whether short- or long-term storage of liquids is intended. When mounting these on chip, a specially designed, customized female fluidic interface with embedded piercing elements is needed, to burst the foil and release the liquid content.

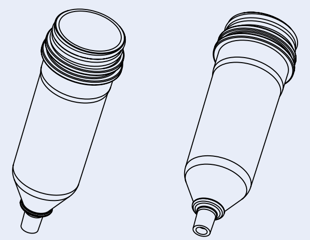


Fig. 675: Schematic drawing of sampling vessel

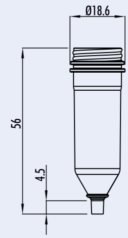


Fig. 676: Detail of sampling vessel

Fig. 677: Sampling vessel a total volume of 6.5 ml

Fig. 678: Sampling vessel prefilled with buffer and inserted swab

Product Code for Fluidic 275	Description	Material	Price [€/10 pieces] 1+	10+
10000219	Sampling vessel 6.5 ml	PP	72.60	48.40

8.6.1.13 Sampling vessels with integrated septum

These 6.5 ml sampling vessels, with a cap at the top with embedded thread O-ring, come with an integrated septum in the male-Luer fluidic interface to the chip. This rather thick and robust septum needs a specially designed, customized chip with an embedded needle inside the fluidic interface, to be able to pierce the septum and release the liquid content. As this septum is re-sealable, no liquid will pour out after removal of the sampling vessel from the chip. Additionally, the vessel comes with a little pressure cap at the bottom, to close the male-Luer interface and prevent from further contamination.

Fig. 679: Sampling vessel with pierceable septum

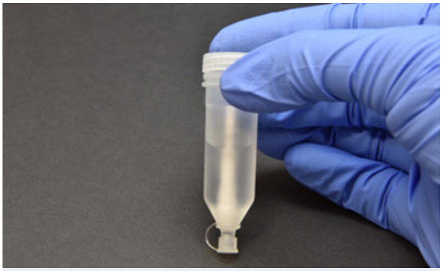


Fig. 680: Sampling vessel prefilled with buffer and inserted swab

Product Code for Fluidic 276	Description	Material	Price [€/10 pieces] 1+	10+
10000339	Sampling vessel 6.5 ml with septum	PP	92.60	58.40

8.6.1.14 Liquid handling & reservoir – Pipette-Chip-Bridge

The special Pipette-Chip-Bridge combines sample uptake with a standard pipette and the mounting of the Pipette-Chip-Bridge on the Luer interfaces of the chip and serving as reservoir. The total volume is 539 μl.

All chips having a female Luer interface as fluidic interface on chip can be used with these devices.

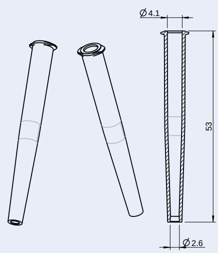


Fig. 681: Pipette-Chip-Bridge (Fluidic 569)

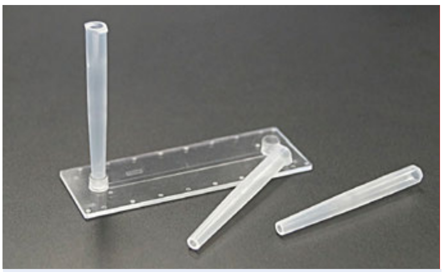


Fig. 682: Pipette-Chip-Bridge Fluidic 569 mounted on Luer interface

Product Code for Fluidic 569	Description	Material	Price [€/10 pieces] 1+	10+	100+
10001078	Pipette-Chip-Bridge	PP	25.00	10.20	5.40

8.6.2 Blister pouches

Blisters can be ordered as stand-alone parts being available with volumes ranging from 50 – 750 µl off-the shelf.

The blisters from 50 – 350 µl volume can be operated with microfluidic devices like blister test chips Fluidic 289 and Fluidic 522, the 500 µl blister requires Fluidic 761.

For convenience reasons, the blisters come with a ring of double sided adhesive tape to be mounted on the chips. Afterwards, the blisters can be removed for blister replacement.

All blisters can be ordered filled either with dye (cyan, magenta, yellow), water (clear) or user-specific liquids (to be provided to *microfluidic ChipShop*). Please inquire custom-fillings with *sales@microfluidic-ChipShop.com*.

Product code (color-dependent)				Description	Blister	Price [€/blister]		
Cyan	Magenta	Yellow	Clear		Volume [µl]	1+	10+	100+
10001605	10001606	10001607	10001608	Blister pouch	50	8.20	5.80	2.95
10001610	10001611	10001612	10001613	Blister pouch	100	8.20	5.80	2.95
10001615	10001616	10001617	10001618	Blister pouch	150	8.20	5.80	2.95
10001620	10001621	10001622	10001623	Blister pouch	200	8.20	5.80	2.95
10001597	10001537	10001538	10001625	Blister pouch	250	8.20	5.80	2.95
10001602	10001601	10001600	10001599	Blister pouch	350	8.20	5.80	2.95
10001603	10001626	10001627	10001628	Blister pouch	500	8.20	5.80	2.95
10001665	10001666	10001667	10001668	Blister pouch	750	8.20	5.80	2.95

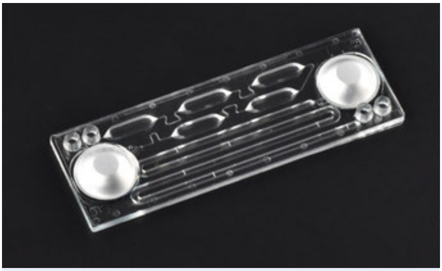


Fig. 683: Blister test chip Fluidic 522

Fig. 684: Blister pouches with different filling volumes

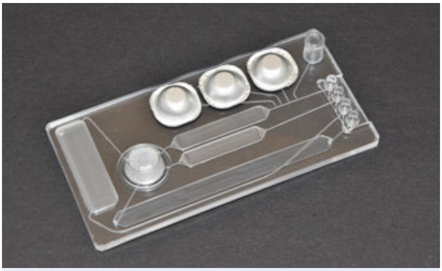


Fig. 685: DNA analysis chip with blister and integrated lateral flow strip

Fig. 686: Blister test chip Fluidic 1021with a variety of aluminum foil pouches

8.7 Tubing

8.7.1 Capillary PEEK tubing

The capillary PEEK tubing is intended to be used with the Upchurch Nanoports but is also suited for various other applications. We recommend to use PEEK tubing in combination with our LOC CCI 1. One package contains one red PEEK tube with a length of 1.524 m.

Fig. 687: Capillary PEEK tubing

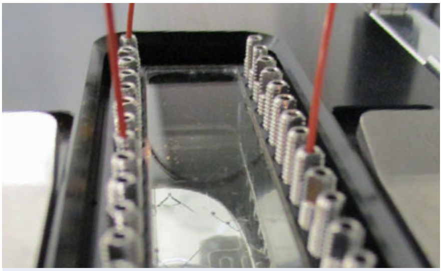


Fig. 688: Capillary PEEK tubing (red) in use with the Lab-on-a-Chip Cell Culture Incubator – LOC CCI 1

Product Code	Description	Material	Quantity	Price [€]
10002000	Capillary PEEK tubing, red ID: 0.127 mm (0.005“), OD: 0.794 mm (1/32“)	PEEK	1.524 m	98.40
10002009	Capillary PEEK tubing, orange ID: 0.508 mm (0.02“), OD: 0.794mm (1/32“)	PEEK	3.048 m	58.39

8.7.2 PTFE tubing

PTFE tubings are standard tubings to connect pumps with microfluidic chips in order to deliver to or to remove liquid from the chip. These tubings can be connected with the microfluidic chip with a silicone sleeve in which the PTFE tubing is introduced, and the silicone sleeve can be either mounted on the olive of a Mini Luer fluid connector or directly on olives integrated on chip.

Product Code	Description	Material	Quantity	Price [€]
10000032	Micro tubes, PTFE, ID: 0.5 mm, OD:1.0 mm	PTFE	1 m	9.50

8.7.3 Silicone tubing

Silicone tubes are used to connect hard plastic tubes like PTFE tubings with pumps or the microfluidic chips and the respective interfaces. The silicone tubes in this catalogue can be mounted on the olives embedded on chips and on olives being part of the Mini Luer fluid connectors.

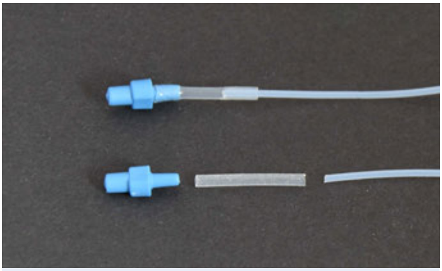


Fig. 689: Assembly of Mini Luer fluid connector, silicone sleeve (from product 10000031) and PTFE tubing

Fig. 690: PTFE tubing interconnected via silicone sleeve to the olive interface of a microfluidic device

Product Code	Description	Quantity	Price [€]
10000031	Silicone tube, ID: 0.76 mm, OD: 1.65 mm	1 m	9.50
10000033	Silicone tube, ID: 0.5 mm, OD: 2.5 mm	1 m	9.50

8.8 Microfluidic chip support kits – Microfluidic and chip-PCR support kits

The **microfluidic support kits** comprise different components necessary for running microfluidic systems. This includes tubes to bring the fluid into the chip, and silicone tubes to enable the interconnection between for example a *microfluidic ChipShop* fluidic platform chip and tubing, or between tubing and a syringe. Forceps can be used to stop a flow by clamping a silicone tube and syringes to fill chips manually.

These small kits allow you to directly start with your microfluidic experiments without losing time searching for suitable components.

For further microfluidic kits, please refer to Chapter 13.

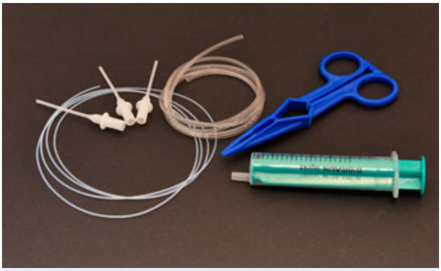


Fig. 691: Microfluidic support kit 1

Fig. 692: Chip-PCR support kit 1

Product Code	Kit Type	Product Description	Product Code	Price [€/kit]
10001632	Microfluidic support kit 1	- Silicone tube (ID: 0.5 mm, OD: 2.5 mm, 1 m) - PTFE tube (ID: 0.5 mm, OD: 1 mm, 1 m) - Forceps (1) - Single-use syringes (10 ml, 3) - Syringe adapter (3)	10000033 10000032 10000641 10000312 10000614	27.80
10001642	Microfluidic support kit 2	- Silicone tube (ID: 0.5 mm, OD: 2.5 mm, 1m) - Silicone tube (ID: 0.76 mm, OD: 1.65 mm, 1m) - PTFE tube (ID: 0.5 mm, OD: 1 mm, 1m) - Forceps (1) - Single-use syringes (10 ml, 3) - Syringe adapter (3) - Male Mini Luer fluid connectors, red, material:PP (10) - Male Mini Luer fluid connectors, blue, material: PP (10) - Male Mini Luer fluid connectors, opaque, material: TPE (10) - Male Mini Luer plugs, green, material: PP (10) - Male Mini Luer plugs, opaque, material: TPE (10)	10000033 10000031 10000032 10000641 10000312 10000614 10000064 10000096 10000116 10000052 10000054	96.50

8.9 Handling frames

To interface our microscopy-slide-sized microfluidic chips, we have developed stackable handling frames which comply with the SBS microtiter plate standard. They can therefore be handled with standard laboratory automation equipment and support the integration of microfluidic devices into your lab workflow. Four microscopy-slide-sized chips can be securely fixed in the frames.

8.9.1 Handling frames for the spacing of a 1536 microtiter plate

These handling frames to be equipped with microfluidic devices allow to use all standard equipment being able to cope with the well spacing of a 1536 microtiter plate for pipetting and read out of the microfluidic chips. The frames are available in different colors for a safe differentiation of different applications.

Furthermore, they are available in two versions: One handling frame has the standard skirt of the microtiter plate, the second one has a reduced height, still complying with standard robots but allowing for a read out of the chips in plate readers or inverted optical microscopes with a reduced optical working distance.

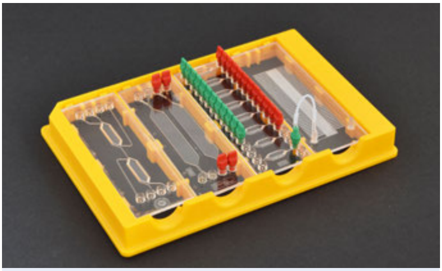


Fig. 693: Handling frame with high skirt in yellow

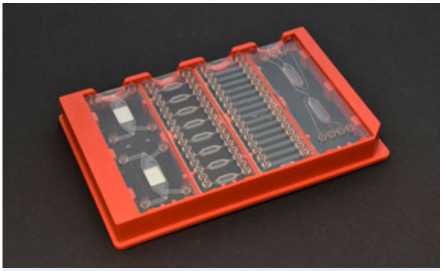


Fig. 694: Handling frame with high skirt in red

Product Code	Description	Color	Price [€] 1+	5+	20+
10000042	Handling frame with high skirt	Yellow	22.00	15.00	12.40
10000043	Handling frame with high skirt	Orange	22.00	15.00	12.40
10000044	Handling frame with high skirt	Red	22.00	15.00	12.40

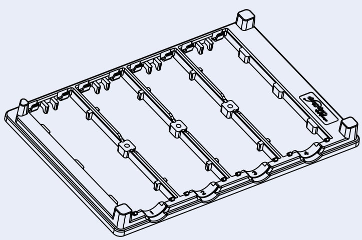


Fig. 695: Shematic drawing of handling frame with flat skirt

Fig. 696: Handling frame with flat skirt with different chip types - frames can be easily stacked

Product Code	Description	Color	Price [€] 1+	5+	20+
10000041	Handling frame with reduced skirt height	Orange	22.00	15.00	12.40

8.9.2 Handling frames for the spacing of a 384 microtiter plate

These handling frames place microfluidic devices in the format of a microscopy slide on the positions of the wells of a 384 well microtiter plate and enable the use of standard robots and readers for the 384 well microtiter plates.

Fig. 697: Handling frame for microscopy slide format chips to fit 384 well positions of a microtiterplate – fitting with 384 well plate readers

Product Code	Description	Price [€] 1+
10000302	Handling frame to comply with the spacing of 384 microtiter plates	128.50

8.9.3 Handling frames for the spacing of a 96 microtiter plate

These handling frames place microfluidic devices in the format of a microscopy slide on the positions of the wells of a 96 well microtiter plate and enable the use of standard robots and readers for the 96 well microtiter plates.

Fig. 698: Handling frame for microscopy slide format chips to fit 96 well positions of a microtiterplate – fitting with 96 well plate readers

Product Code	Description	Price [€] 1+
10000419	Handling frame to comply with the spacing of 96 microtiter plates	128.50

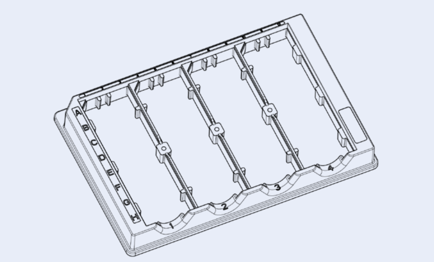


Fig. 699: Handling frame for 96 well microplate readers, design specific for microfluidics chips with chamfered corner design

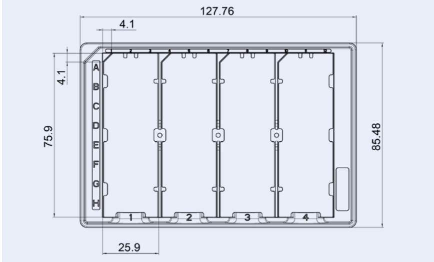


Fig. 700: Details drawing of handling frame 1059

Product Code	Description	Color	Price [€] 1+	 10+	 100+
10001543	Handling frame to comply with the spacing of 96 microtiter plates for chips with chamfered corner	black	22.00	15.00	12.40

8.10 Chip lids

For some applications it is of interest to protect the chip against the environment, e.g. to avoid evaporation, changing environmental conditions or contaminations. Special chip lids are at hand to mount them loosely on chips and handling frames.

8.10.1 Chip lid – Microtiter plate format

To cover the handling frame in the microtiter plate format equipped with microfluidic chips, a cover lid for device sizes of a microtiter plate is available.

Fig. 701: Chip lid Fluidic 854 – For microtiter plate-sized devices

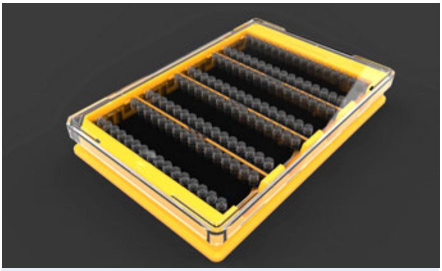


Fig. 702: Chip lid Fluidic 854 with handling frame and slide-sized microfluidic devices

Product Code	Description	Material	Price [€/ 10 pieces] 1+	 10+
10000975	Chip lid Fluidic 854 – For microtiter plate-sized devices	Topas	32.10	19.95
10001087	Chip lid Fluidic 854 – For microtiter plate-sized devices	PS	32.10	19.95

8.11 Reagents

In order to enable a convenient use of our microfluidic systems, reagents are offered to fulfill special requirements.

Special oils are used in microfluidic systems e.g. in droplet generator chips to generate and separate individual droplets, in PCR chips to avoid evaporation or the separation of sample plugs. The right choice of the oil is crucial since viscosity, material and reaction compatibility have to be taken into consideration.

Note: Our base-oil for droplet generation does not contain a surfactant, those have to be added prior to the experiment.

Product Code	Description	Quantity	Material compatibility	Application	Price [€]
10000163	mcs-oil-02	10 m	PC	PCR compatible	28.50
10001079	mcs-oil-04	10 ml	PC, PMMA, COC, COP	PCR compatible	35.40
10000677	base-oil for droplet generation (additional surfactant needed)	10 ml	PC	Droplet generation	22.40
10001548	mcs-droplet oil with 2% surfactant	3 x 4 ml	PC	Droplet generation	212.00

8.12 Storage & transport: Boxes for microfluidic devices

Despite that most of the standard microfluidic modules come in standard formats like the microscopy slide or microtiter-plate format, standard storage solutions do not necessary cope with the demand either in respect of clean handling or the special format of the microfluidic devices that have e.g. a different thickness than their "standard" counterpart or have integrated fluidic interfaces that also might interfere with conventional solutions.

microfluidic ChipShop's chip storage solutions are specially adapted to the design features of microfluidic devices.

Various storage box types in multiple colors are available. All allow for an easy uptake of the chip by sliding the top cover.

8.12.1 Storage & transport: Boxes for microfluidic devices – Chip size: Slide format

For chips in the format of a microscopy slide (25.5 mm x 75.5 mm), four storage box types are available. The smallest box, Fluidic 832, is made for chips with 1 – 2 mm thickness. 10 chips without fluidic interfaces and 5 with fluidic interfaces can be placed in the box.

Our medium sized box, Fluidic 839, can retain up to 20 chips (w/o interface) with 1 – 2 mm thickness and 10 chips with fluidic interface.

The two larger boxes allow for the storage of chips in a thickness range from 1 – 2 mm, the other option copes with thicker devices from 3 to 4 mm thickness.

Fig. 703: Small microfluidic chip storage boxes Fluidic 832 for slide-format chips. Available colors are depicted to the right

Fig. 704: Small microfluidic chip storage box Fluidic 832 for slide-format chips – opened with chips

Product Code for Fluidic 832	Description	Color	Material	Price [€/pieces] 1+	10+
10000990	Microfluidic device storage box - small	White	PP	17.10	11.90
10001186	Microfluidic device storage box - small	Emerald	PP	17.10	11.90
10001189	Microfluidic device storage box - small	Dark blue	PP	17.10	11.90
10001188	Microfluidic device storage box - small	Light blue	PP	17.10	11.90
10001185	Microfluidic device storage box - small	Apple green	PP	17.10	11.90
10001187	Microfluidic device storage box - small	Orange	PP	17.10	11.90
10001184	Microfluidic device storage box - small	Lilac	PP	17.10	11.90

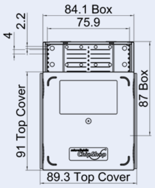


Fig. 705: Medium microfluidic chip storage box for devices with 1.0 – 2.0 mm thickness

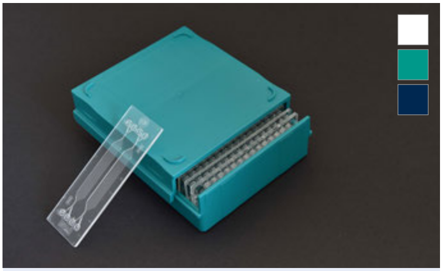


Fig. 706: Medium microfluidic chip storage box for slide-format chips. Available colors are depicted to the right

Product Code for Fluidic 839	Description	Color	Material	Price [€/pieces] 1+	10+
10001226	Microfluidic device storage box - medium	White	PP	18.10	12.50
10001175	Microfluidic device storage box - medium	Emerald	PP	18.10	12.50
10001176	Microfluidic device storage box - medium	Dark blue	PP	18.10	12.50

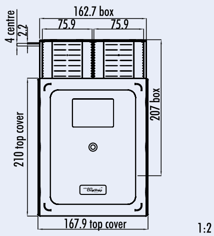


Fig. 707: Large microfluidic chip storage box Fluidic 889 for devices with 1.0 – 2.0 mm thickness

Fig. 708: Large microfluidic chip storage box for devices with 1.0 – 2.0 mm thickness. Available colors are depicted to the right

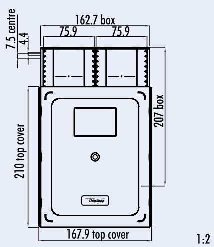


Fig. 709: Microfluidic chip storage box Fluidic 890 for devices with 3.0 – 4.0 mm thickness

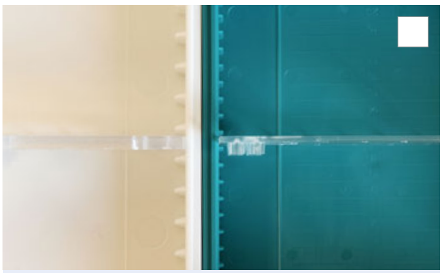


Fig. 710: Comparison of Fluidic 890 and Fluidic 889 for microfluidic devices with different thicknesses. Available color for Fluidic 890 is depicted to the right.

Product Code	Description	Color	Material	Price [€/pieces] 1+	10+
10001199	Microfluidic chip storage box - large 1.00 - 2.00 mm thickness, Fluidic 889	Opaque	PP	19.10	12.90
10001198	Microfluidic chip storage box - large 1.00 - 2.00 mm thickness, Fluidic 889	Emerald	PP	19.10	12.90
10001197	Microfluidic chip storage box - large 1.00 - 2.00 mm thickness, Fluidic 889	Dark blue	PP	19.10	12.90
10000162	Microfluidic chip storage box - large 3.00 - 4.00 mm thickness, Fluidic 890	White	PP	19.10	12.90

8.12.2 Storage & transport: Boxes for microfluidic devices – Chip size: Extended size I platform format

For chips in *microfluidic ChipShop's* "extended size I platform format", namely 16 mm x 95 mm, 10 chip without fluidic interfaces and 5 with fluidic interfaces can be placed.

Fig. 711: Microfluidic chip storage box Fluidic 811 for for microfluidic chips sized 16 mm x 95 mm in various colors. Available colors are depicted to the right

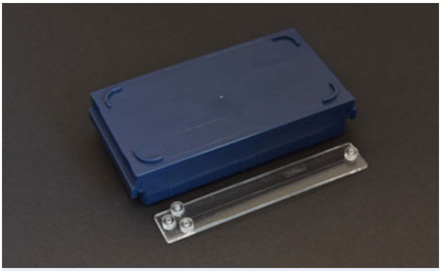
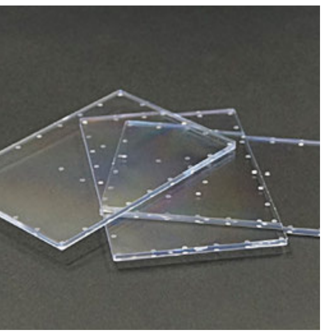
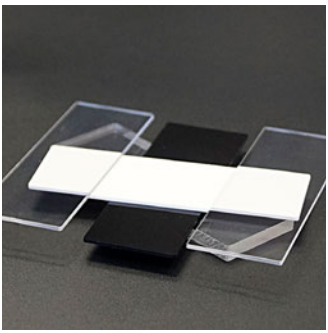
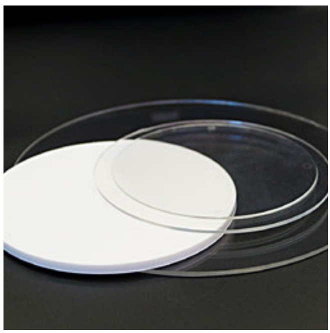


Fig. 712: Microfluidic chip storage box Fluidic 811 for microfluidic chips sized 16 mm x 95 mm – with compatible chips

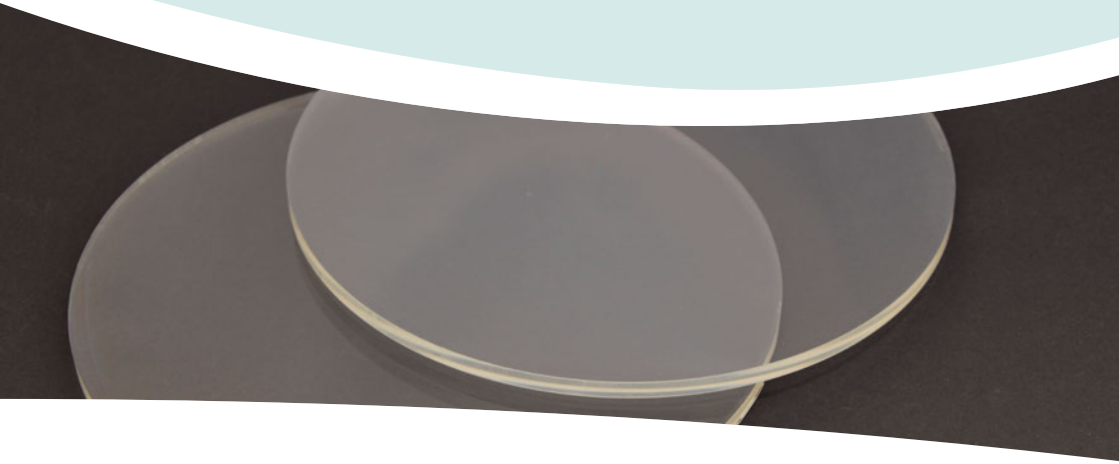
Product Code for Fluidic 811	Description	Color	Material	Price [€/pieces] 1+	10+
10001108	Microfluidic device storage box - extended	White	PP	17.10	11.90
10001225	Microfluidic device storage box - extended	Emerald	PP	17.10	11.90
10001191	Microfluidic device storage box - extended	Dark blue	PP	17.10	11.90
10001190	Microfluidic device storage box - extended	Lilac	PP	17.10	11.90







9 Polymer substrates and foils



Polymer substrates and foils

Some interesting materials that are useful in microfluidics, in particular a range of different polymers, are either not commercially available as plate materials or not of sufficient quality for the special requirements of microfabrication. If you are in need of plain substrate material, e.g. for hot embossing experiments or as unstructured platform for surface chemistry experiments, we can provide you with substrates in our standard formats like microscopy-slide, microtiterplate or round substrates with various diameters. Wafers, to be used, for instance, as substrates for hot embossing, come in several units in one package. Since surface quality is important, each wafer is packaged separately.

The dimensions of the substrates may differ in the range of 0.5 % depending on the material.

In case the material or color you require is not listed, we are happy to provide you with a customized quote for a substrate matching your material needs.

Besides the thicker polymer substrates in various formats, special foil materials, either in rool format or as pre-cut foils in slide format, in different thickness are available.

9.1 Wafer format – 100 mm diameter

Product Code	Material	Thickness [mm]	Comment	Price [€/per unit*] 1+	10+	50+
10000241	PMMA	1.0	individually wrapped	75.00	62.00	36.00
10000257	Topas	1.0	individually wrapped	75.00	62.00	36.00
10000240	PC	1.0	individually wrapped	75.00	62.00	36.00
10000869	Zeonex	1.0	individually wrapped	75.00	62.00	36.00
10000383	Zeonor	1.0	individually wrapped	75.00	62.00	36.00

* 1 unit consists of 10 wafers

9.2 Wafer format – 115 mm diameter

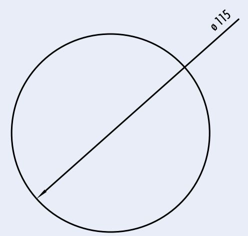


Fig. 713: Schematic drawing of 115 mm diameter wafer


Fig. 714: Polymer substrate – wafers

Product Code	Material	Thickness [mm]	Comment	Price [€/per unit*] 1+	10+	50+
10000149	Topas	2.0	individually wrapped	75.00	62.00	36.00
10000150	PC	2.0	individually wrapped	75.00	62.00	36.00
10000151	Zeonex	2.0	individually wrapped	75.00	62.00	36.00
10000152	Zeonor	2.0	individually wrapped	75.00	62.00	36.00
10000153	Topas	1.5	individually wrapped	75.00	62.00	36.00
10000154	PC	1.5	individually wrapped	75.00	62.00	36.00
10000155	Zeonex	1.5	individually wrapped	75.00	62.00	36.00
10000156	Zeonor	1.5	individually wrapped	75.00	62.00	36.00

* 1 unit consists of 10 wafers

9.3 Wafer format – 180 mm diameter

Product Code	Material	Thickness [mm]	Comment	Price [€/per unit*] 1+	10+	50+
10000725	Topas	1	individually wrapped	120.00	98.00	55.00
10000726	Zeonor	1	individually wrapped	120.00	98.00	55.00
10000727	Topas	2	individually wrapped	120.00	98.00	55.00
10000728	Zeonor	2	individually wrapped	120.00	98.00	55.00
10000729	Topas	3	individually wrapped	130.00	106.00	59.00
10000730	Zeonor	3	individually wrapped	130.00	106.00	59.00
10000731	Topas	4	individually wrapped	130.00	106.00	59.00
10000732	Zeonor	4	individually wrapped	130.00	106.00	59.00
10000733	Topas	5	individually wrapped	140.00	114.00	63.00
10000734	Zeonor	5	individually wrapped	140.00	114.00	63.00
10000735	Topas	6	individually wrapped	140.00	114.00	63.00
10000736	Zeonor	6	individually wrapped	140.00	114.00	63.00

* 1 unit consists of 10 wafers

9.4 Microtiter plate format (127.76 x 85.48 mm)

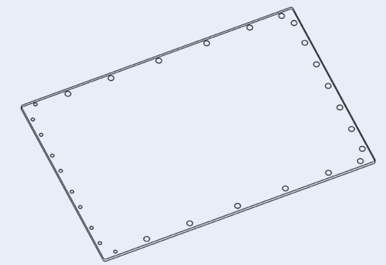


Fig. 715: Schematic drawing of substrate in microtiterplate format

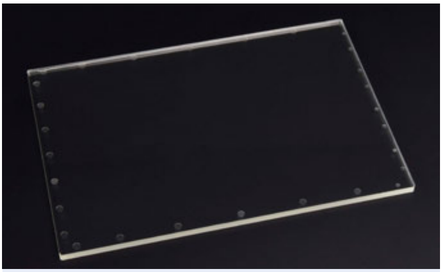


Fig. 716: Polymer substrate – microtiter plate format

Product Code	Material	Thickness [mm]	Comment	Price [€/per unit*] 1+	10+	50+
10000706	Topas	1.5	individually wrapped	75.00	62.00	36.00
10000707	Zeonor	1.5	individually wrapped	75.00	62.00	36.00
10000747	Topas	2	individually wrapped	75.00	62.00	36.00
10000748	Zeonor	2	individually wrapped	75.00	62.00	36.00
10000746	Topas	2.5	individually wrapped	75.00	62.00	36.00
10000708	Zeonor	2.5	individually wrapped	75.00	62.00	36.00
10000749	Topas	3	individually wrapped	75.00	62.00	36.00
10000750	Zeonor	3	individually wrapped	75.00	62.00	36.00

* 1 unit consists of 10 substrates

9.5 Microscopy slide format (75.5 mm x 25.5 mm)

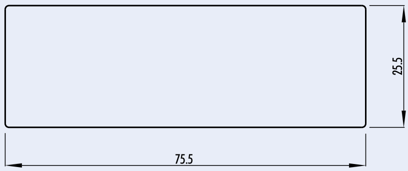


Fig. 717: Schematic drawing of the slide substrate

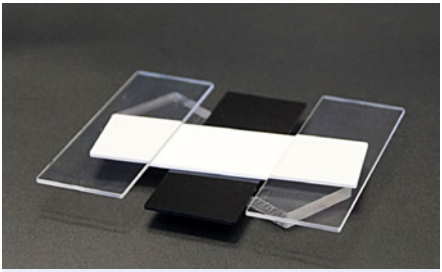


Fig. 718: Various polymeric substrates in the format of a microscopy slide

Product Code	Material	Thickness [mm]	Comment	Price [€/per unit*] 1+	10+	50+
10000000	PMMA	1.0	Individually wrapped	55.00	30.00	22.00
10000001	PMMA black	1.0	Individually wrapped	55.00	30.00	22.00
10000002	Topas	1.0	Individually wrapped	55.00	30.00	22.00
10000130	PC	1.0	Individually wrapped	55.00	30.00	22.00
10000838	PS	1.0	Individually wrapped	55.00	30.00	22.00
10000131	Zeonex	1.0	Individually wrapped	55.00	30.00	22.00
10000132	Zeonor	1.0	Individually wrapped	55.00	30.00	22.00
10000133	Zeonor black	1.0	Individually wrapped	55.00	30.00	22.00
10000134	PMMA	1.5	Individually wrapped	55.00	30.00	22.00
10000135	Topas	1.5	Individually wrapped	55.00	30.00	22.00
10000136	PC	1.5	Individually wrapped	55.00	30.00	22.00
10000137	Zeonex	1.5	Individually wrapped	55.00	30.00	22.00
10000138	Zeonor	1.5	Individually wrapped	55.00	30.00	22.00
10000452	PMMA	2	Individually wrapped	55.00	30.00	22.00
10000443	Topas	2	Individually wrapped	55.00	30.00	22.00
10000454	PC	2	Individually wrapped	55.00	30.00	22.00
10000455	Zeonex	2	Individually wrapped	55.00	30.00	22.00
10000456	Zeonor	2	Individually wrapped	55.00	30.00	22.00
10000457	Topas	4	Individually wrapped	75.00	35.00	22.00
10000458	PC	4	Individually wrapped	75.00	35.00	22.00
10000141	Zeonex	4	Individually wrapped	75.00	35.00	22.00

* 1 unit consists of 10 slides

9.6 Double slide format (75.5 mm x 50 mm)

Product Code	Material	Thickness [mm]	Comment	Price [€/per unit*] 1+	10+	50+
10000762	PMMA	2.0	Individually wrapped	76.00	44.50	24.90
10000763	Topas	2.0	Individually wrapped	76.00	44.50	24.90
10000764	PC	2.0	Individually wrapped	76.00	44.50	24.90
10000765	Zeonor	2.0	Individually wrapped	76.00	44.50	24.90

* 1 unit consists of 10 slides

9.7 Foils in roll format

For special requirements thin foils in various materials are offered. This includes pure polymer foils as well as adhesive tapes.

Our foils are offered in roll format with fixed dimensions. Some of our foils we also offer already pre-cut to standard microscope slide format. While we strive to have all foils listed below in stock, our foil range might change or increase slightly. For up-to-date stock information please refer to our webpage *www.microfluidic-ChipShop.com* or contact us via *sales@microfluidic-chipshop.com*.

Product Code	Description	Material	Format			Tg [°C]	Thickness [µm]	Protective Foil	Price [€]
			Width [mm]	Lenght [m]	Total Area [m^2]				
10001368	mcs-foil 005	Zeonor	24.5	10	0.245	136	188	one-sided	81.85
10001750	mcs-foil 005	Zeonor	160.0	10	1.6	136	188	one-sided	233.00
10001749	mcs-foil 005	Zeonor	340.0	10	3.4	136	188	one-sided	467.00
10001371	mcs-foil 015	Zeonor	24.5	10	0.245	136	100	one-sided	81.85
10001372	mcs-foil 015	Zeonor	30.0	10	0.3	136	100	one-sided	89.00
10001373	mcs-foil 015	Zeonor	85.0	10	0.85	136	100	one-sided	160.50
10001727	mcs-foil 051	Zeonor	340.0	10	3.4	136	50	one-sided	467.00
10001726	mcs-foil 128	Zeonor	170.0	10	1.7	163	100	one-sided	246.00
10001377	mcs-foil 029	Topas	600.0	10	6.0	78	240	none	493.00
10001591	mcs-foil 011	Topas	95.0	10	0.95	78	140	one-sided	129.80
10001380	mcs-foil 011	Topas	600.0	10	6.0	78	140	one-sided	493.00
10001722	mcs-foil 011	Topas	160.0	10	1.6	78	140	two-sided	165.80
10001723	mcs-foil 011	Topas	320.0	10	3.2	78	140	two-sided	306.60
10001942	mcs-foil 150	Topas	160.0	10	1.6	78	100	two-sided	165.80
10001999	mcs-foil 112	Topas	160.0	10	1.7	142	175	two-sided	174.60
10001382	mcs-foil 080	Topas	85.0	10	0.85	142	125	two-sided	116.30
10001383	mcs-foil 080	Topas	900.0	5	4.5	142	125	two-sided	376.00
10001752	mcs-foil 079	Topas	160.0	10	1.6	142	100	two-sided	165.80
10001387	mcs-foil 077	Topas	900.0	5	4.5	142	50	two-sided	376.00
10001725	mcs-foil 042	PC	30.0	10	0.3	145	175	two-sided	70.61
10001724	mcs-foil 042	PC	110.0	10	1.1	145	175	two-sided	100.57
10001702	mcs-foil 146	PMMA	160.0	10	1.6	109	100	two-sided	134.92
10002091	mcs-foil 146	PMMA	320.0	10	3.2	109	100	two-sided	244.84
10001703	mcs-foil 147	PMMA	160.0	10	1.6	109	175	two-sided	134.92
10001704	mcs-foil 147	PMMA	320.0	10	3.2	109	175	two-sided	244.84
10001705	mcs-foil 148	PMMA	160.0	10	1.6	109	250	two-sided	134.92
10002092	mcs-foil 148	PMMA	320.0	10	3.2	109	250	two-sided	244.84
10001388	mcs-foil 008	Double-sided adhesive tape	140.0	10	1.4	-	140	two-sided	150.30

9.8 Pre-cut foils (75.5 mm x 25.5 mm)

Product Code	Description	Material	Thickness [µm]	Tg [°C]	Pre-cut foils/ packing unit	Price [€/per unit*]
10001689	mcs-foil-005	Zeonor	188	136	25	44.63
10001690	mcs-foil-011	Topas	140	78	25	39.90
10001691	mcs-foil-112	Topas	175	142	25	39.90
10001692	mcs-foil-042	PC	175	145	25	37.73

* 1 unit consists of 25 pcs


ChipGenie P


ChipGenie E2

10 ChipGenie® editions – Instruments and applications

10 ChipGenie® editions – Instruments and applications

Using microfluidic systems in the daily laboratory life usually requires not only the chips but also the relevant instrumentation. Here, our ChipGenie® editions come into play.

ChipGenie® edition T, for instance, consists of both chips in a variety of formats and a matching temperature control unit to enable you to directly start your reactions/amplifications in a fraction of the time compared to conventional instruments.

ChipGenie® edition E2, an extremely compact electrophoresis system, allows the label-free detection of small ions thanks to its contactless conductivity detection scheme. Again, the instrument is complemented by a variety of chips ideally suited for the system.

ChipGenie® edition P is a compact versatile instrument for on-chip magnetic bead-handling and heating, e.g. for sample preparation like DNA extraction.

Breadboard-systems for functional evaluation of special microfluidic elements are part of the ChipGenie® edition as well. ChipGenie® edition BD addresses the emptying of blisters, ChipGenie®edition TV allows for the control of turning valves.

10.1 ChipGenie® edition T – Heating and PCR systems

The ChipGenie® edition T summarizes the instrument family used for chip-based applications requiring heating like for instance PCR and additionally include the optical read-out allowing e.g. for real-time PCR.

10.1.1 ChipGenie® edition TSO - On-Chip qPCR thermocycler

The ChipGenie® edition TSO instruments allow for the temperature control of microfluidic chips in microscope slide format. A fixed temperature as well temperature cycling can be done to enable e.g. a fast PCR on chip. The ChipGenie® edition TSO is also equipped with a fluorescence-based read-out unit to carry out the optical detection on *microfluidic ChipShop's* chamber chips following the spacing of a 384 well plate of 4.5 mm with fixed read-out positions.

Microfluidic chips that are particularly suited for use with this device are reaction chamber chips such as Fluidics 843; 750; 585; 584 and 842. Please refer to Chapter 3 for more information.

The instrument	Compact lab device containing: • Thermocycling unit for one microscope slide format chip (heating/cooling rate 8°C/s) • Fluorescence detector for up to three pre-defined detection channels
The microfluidic chip	• Reaction chamber of the system • Available with various chamber volumes
The software	• User friendly program allowing: Experimental setup Data analysis • Connection established via USB port

Fig. 719: ChipGenie® edition TS

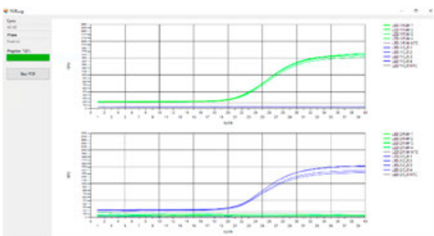


Fig. 720: qPCR readouts obtained and analyzed using ChipGenie® edition TSO and the included software

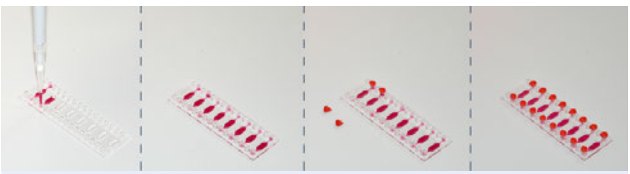


Fig. 721: Filling of a reaction chamber with with PCR master mix

Product Code	Description	Price [€]
10001106	ChipGenie® edition TSO: Heating & PCR-system for microfluidic chips in the format of a microscope slide with fluorescence read-out unit (two colors)	10,736.00

10.1.2 ChipGenie® edition TSO-3Z - Multiple heater set-up & continuous-flow-PCR

ChipGenie® edition TSO-3Z instruments are equipped with three temperature zones for the so-called continuous flow PCR. The temperature zones are kept at fixed temperature and the temperature cycling is achieved by moving the liquid in the chip over two or three temperature zones of the instrument resulting in ultrafast temperature cycles. The ChipGenie® edition TSO-3Z is equipped with a fluorescence-based read-out unit to carry out the optical detection.

microfluidic ChipShop offers an innovative system for PCR on the chip. Different from conventional PCR with heating-up and cooling-down cycles, in this chip-PCR system the complete reaction vessel is temperature controlled: The PCR solution flows through separated temperature zones, winding itself through the temperature profile. The time-determining step in PCR – the carrying out of the repeated heating and cooling cycles – is no longer necessary since the temperature in the heating zones remains constant and only the liquid undergoes the temperature cycling.

The PCR system comprises the PCR chip and the thermocycler (or better: thermal control unit, as no cycling in the conventional sense is involved) that has been specially developed for Lab-on-a-Chip applications. A pump moves the PCR solution through the chips. In comparison to conventional systems, this lab-on-a-chip PCR system allows for a significant reduction of the PCR reaction time: Without much optimization, a 15-cycle PCR can be completed in less than five minutes. For a choice of continuous flow PCR chips please refer to the respective chapter 3.14.

In order to allow you easy use of the PCR system we offer chip-PCR support kits (that include tubes and mineral oil for pumping the PCR solution) as well as pumps for the driving of the fluids.

Fig. 722: 40 cycle continuous-flow PCR chip Fluidic 243

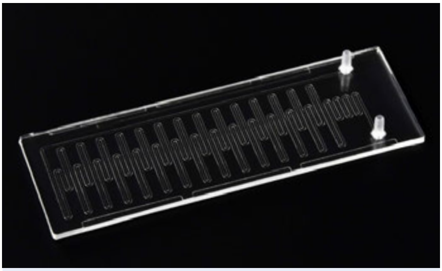


Fig. 723:15-cycle continuous-flow PCR-chip

Product Code	Description	Price [€]
10001113	ChipGenie® edition TSO-3Z: Heating & PCR-system for microfluidic chips in the format of a microscopy slide with three temperature zone sincluding fluorescence read-out unit (two colors)	15,662.79

10.2 ChipGenie® edition E2 - Capillary electrophoresis system with contactless conductivity detection

ChipGenie® edition E2 – a rugged and small lab device which is ideally suited for your microfluidic-based label free detection of cations and anions. The analyte separation is done via capillary electrophoresis, using the contactless capacitively coupled conductivity detection (C^4D) scheme for sample identification.

The ChipGenie® edition E2 uses a powerful separation technique allowing the fast detection of small and large molecules, which can be organic or inorganic, simplified in handling and down to a detection limit of $\leq 10\ \mu mol\ l^{-1}$ making it a one-for-all analytical tool. Applications can be found in biological, environmental and chemical research and samples can be as diverse as mineral water, fertilizers, blood serum, urine, or foodstuffs (e.g. wine or milk). The excact assay conditions have to be set by the end-user.

The instrument	Compact lab device containing: • High voltage power supply and platinum electrodes for ion separation • High frequency electronics, based on C^4D principle, for ion identification
The microfluidic chip	• Reaction chamber of the system • Carries a pair of detection electrodes at the outside • Contains: Sample and buffer injection ports Sample injection, as well as sample separation channel
The software	• Easy-to-use program allowing: System control Data read-out • Connection established via USB port

Fig. 724: ChipGenie® edition E2 capillary electrophoresis unit

Fig. 725: ChipGenie® edition E2 – starter kit 1

When starting an analysis using ChipGenie® edition E2, the preprogrammed high voltage sequence that can achieve values from 0.01 to 4 kV, is applied along the microchannel, leading to sample migration through the capillary. The charged analytes reach the detection zone at the end of the capillary and interact with the high frequency signal from the transmitter electrode. The interaction changes the amount of electrical current flowing through the chip, which is detected by the receiver electrode. The signal is converted via a trans-impedance amplifier into a voltage signal, depicted in the output electropherogram. The signal changes are owed to different relative permittivity of each analyte inside the sample mix.

The ChipGenie® edition E2 can be operated with a variety of microfluidic chips in the Cross-shaped channel design with Luer interface (see Fig. 618). They carry thin film detection electrodes (10 nm titanium, 100-150 nm gold), buffer and sample injection sites (reservoirs of $\leq 70\ \mu l$) and the separation channel. They are available in different materials whereby for most applications PMMA is the material of choice. To achieve maximum reliability of your analysis, the microfluidic chips are consumables and hence recommended to be replaced after each analysis.

Fig. 726: ChipGenie® edition E2 – starter kit 2

Fig. 727: Microfluidic chips for the ChipGenie® edition E2 series

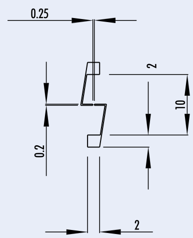


Fig. 728: Details of the electrodes

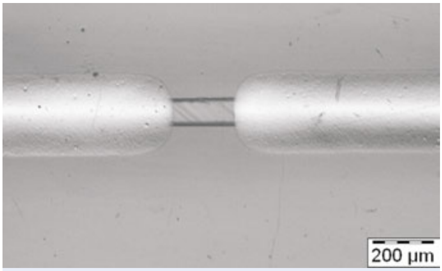


Fig. 729: Microscopy image of electrodes over microchannel

Product Code	Channel Width [µm]	Channel Depth [µm]	Channel Length [mm]	Geometry A [mm]	Geometry B [mm]	Geometry C [mm]	Geometry D [mm]	Lid Thickness [µm]	Material	Price [€/chip] 1+	Price [€/chip] 10+	Price [€/chip] 100+
10001805	50	50	87.0	6.0	5.0	5.0	0	60	PMMA	125.00	85.00	32.50
10001804	50	50	87.0	6.0	5.0	5.0	0.1	60	PMMA	125.00	85.00	32.50
10001921	100	100	87.0	6.0	5.0	5.0	0	60	PMMA	125.00	85.00	32.50
10000338	100	100	87.0	6.0	5.0	5.0	0	50	Zeonor	125.00	85.00	32.50

Product Code	Description	Dimensions [cm]	Price [€/instrument]
10001316	ChipGenie® edition E2 instrument	19 x 13 x 25.7	5,698.55

Product Code	Description	Detail	Product Code	Price [€]
10001694	ChipGenie® edition E2 starter kit 1	- ChipGenie® edition E2 instrument - Cross-shaped channel chips (50 µm width/50 µm depth), T-junction, material: PMMA (2) - Cross-shaped channel chips (50 µm width/50 µm depth), double T-junction, material: PMMA (2) - Cross-shaped channel chips (100 µm width/100 µm depth), T-junction, material: PMMA (2) - Cross-shaped channel chips (100 µm width/100 µm depth), T-junction, material: Zeonor (2) - Single-use syringes, 1 ml (10) - 10 ml mcs buffer 03 (separation buffer) - ChipGenie® edition E starter kit 3 – standards: Cation standard solution, Li^+ , Na^+, K^+ (1 ml) Anion standard solution, Cl^-; NO_3^-, SO_4^{2-} (1 ml) Organic acid standard solution, tartaric acid, succinic acid, citric acid (1 ml)	10001316 10001805 10001804 10000337 10000338 10000719 10000987 10000516	6,146.25
10001695	ChipGenie® edition E2 starter kit 2	- Cross-shaped channel chips (50 µm width/50 µm depth), T-junction, material: PMMA (2) - Cross-shaped channel chips (50 µm width/50 µm depth), double T-junction, material: PMMA (2) - Cross-shaped channel chips (100 µm width/100 µm depth), T-junction, material: PMMA (2) - Cross-shaped channel chips (100 µm width/100 µm depth), T-junction, material: Zeonor (2) - Single-use syringes, 1 ml (10) - 10 ml mcs buffer 03 (separation buffer) - ChipGenie® edition E2 starter kit 3 – standards: Cation standard solution, Li^+ , Na^+, K^+ (1 ml) Anion standard solution, Cl^-; NO_3^-, SO_4^{2-} (1 ml) Organic acid standard solution, tartaric acid, succinic acid, citric acid (1 ml)	10001805 10001804 10001921 10000338 10000719 10000987 10000516	790.00
10000516	ChipGenie® edition E2 kit 3 – standards	- Cation standard solution, Li^+ , Na^+, K^+ (1 ml) - Anion standard solution, Cl^-; NO_3^-, SO_4^{2-} (1 ml) - Organic acid standard solution, tartaric acid, succinic acid, citric acid (1 ml)		78.20

10.3 On-chip sample-preparation system – ChipGenie® edition P

ChipGenie® edition P – a compact lab device which is ideally suited for your microfluidic bead-based on-chip sample preparation. Potential applications that can be implemented using ChipGenie® edition P are the purification of nucleic acids, cell lysis or hybridization experiments in combination with the continuous flow principle, making it a multi-purpose analytical tool.

The ChipGenie® edition P features a click-in holding frame, in order to operate standard microscopy slide format microfluidic chips. The instrument is equipped with a uniform linearly moving magnet (speed of 4 mm/s), as well as a heating element (adjustable between room temperature and 60°C) both controlled independently by switches. These sample preparation units are located below the chip, which serves as the reaction chamber of the system.

The bench top device comes with a 6V, 3,5A DC power supply and offers convenient handling features. This includes a LED signal that indicates the current operating status, as well as an LCD screen to display the set temperature and current temperature. The arrangement of the switches provides a comfortable handling for pipetting in manual use.

The instrument	• Microscopy slide format chip holding frame • Adjustable heating element • Permanent magnetic mixer element • Temperature display
The microfluidic chip	• Reaction chamber of the system • Interface for liquid in- and output • Carrier of the magnetic beads

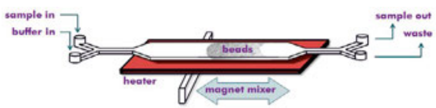


Fig. 730: Principle of a bead-based assay with the ChipGenie® edition P instrument

Fig. 731: ChipGenie® edition P instrument with inserted chip

When starting an analysis using ChipGenie® edition P, the microfluidic chip is inserted into the holding frame. The liquid supply is implemented via the chip interface enabling a manual (pipette) or semi-automatically (pump-system) operation. For routine sample preparations chapter 13 highlights our kits for an immediate start of your analysis. Those kits enable DNA extraction from whole blood or from bacterial suspensions. A suitable protocol, exhibiting a temperature profile and the bead-based mixing conditions may be established according to the one exemplarily shown in our applications notes in chapter 15.

The ChipGenie® edition P can be operated with a variety of microfluidic rhombic chamber chips with lengthwise chamber orientation (please refer to Chapter 3.7.2.1). They are available in different materials, such as COC, PC or PMMA. To achieve maximum reliability of your analysis, the chips are considered as disposals and hence recommended to be replaced after each analysis.

Product Code	Description	Dimensions [cm]	Price [€/instrument]
10000166	ChipGenie® edition P instrument	10 x 15 x 3.5	1,911.25

10.4 ChipGenie® edition BD

microfluidic ChipShop's blister driver ChipGenie® edition BD is a breadboard system tailored for evaluation of blister emptying behavior. Blisters offer a reliable long-term liquid storage option on-chip. The device has been specifically developed to be used with *microfluidic ChipShop*'s microscope slide-format blister test chips Fluidic 289 and Fluidic 522. The instrument ensures both a convenient, user-friendly chip insertion and a precise positioning of the inserted blister chip. Blister emptying is facilitated by two independent, high-precision vertical blister drives, while an integrated camera gives immediate visual feedback.

The instrument	• Two independent, high-precision vertical blister drives (driver speed 0.1 µm/s up to 200 µm/s; positioning accuracy +/- 20 µm) • Integrated camera for direct visual feedback
The microfluidic chip	• Microscope slide format with mounted blister pouches for liquid storage • Enables liquid metering and flow rate test • Customized blister filling service is available
The software	• User friendly program allowing system control • Connection established via USB port

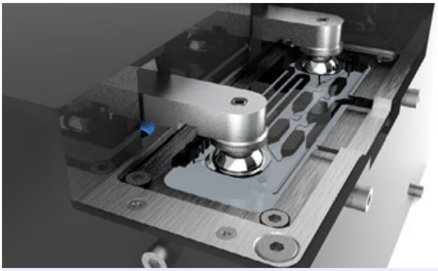


Fig. 732: Blisters of blister test chip being actuated by the ChipGenie® edition BD instrument

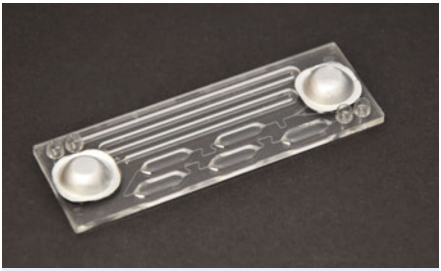


Fig. 733: The blister test chip Fluidic 522 can be operated with ChipGenie® edition BD

Product Code	Description	Dimensions [cm]	Price [€/instrument]
10000686	ChipGenie® edition BD – Blister Driver instrument	20 x 12 x 11	4,725.60

10.5 ChipGenie® edition TV

ChipGenie® edition TV enables a strict control of turning valves. The breadboard system rotates the valves and sets exactly the experimental time frame – when and how each valve should be positioned. Countless experimental set-ups can be generated by combining the wide variety of *microfluidic ChipShop´s* valves.

The instrument	• Two independent, high-precision 360° turning valve drives (positioning accuracy: +/- 1°) • Integrated camera for direct visual feedback • Integrated peristaltic pump with selectable flow rates for liquid actuation
The microfluidic chip	• Enables various turning valve applications (e.g. metering loops, liquid routing) • Large variety of turning valve-containing microfluidic chips is available
The software	• User friendly program allowing system control • Connection established via USB port

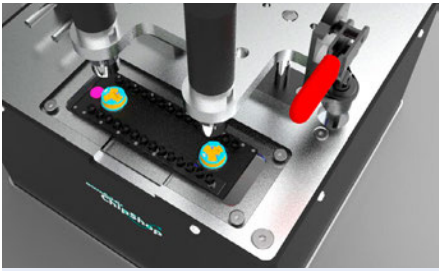


Fig. 734: Principle of valve turning with ChipGenie® edition TV (turning vales depicted in blue/yellow)

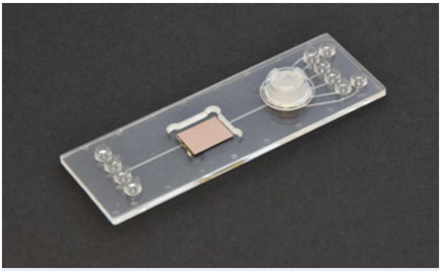


Fig. 735: Microfluidic chip containing a turning valve and an additional sensor integration area - Fluidic 673

Product Code	Description	Dimensions [cm]	Price [€/instrument]
10000787	ChipGenie® edition TV – Turning Valve instrument	17 x 18 x 16	5,527.50


dropbot
Model: DB3-120


WTi

11 Special instruments

Special instruments

This chapter compiles special instruments like incubators for cell-based assays, a dielectrophoresis unit and spotting instrumentation. Furthermore, instruments from our partner companies are featured in this chapter.

11.1. Lab-on-a-Chip Handling Platform / Cell Culture Incubator – LOC HP & LOC CCI

The Lab-on-a-Chip Handling Platform – LOC HP is a versatile device to enable quick and easy fluidic interface connection. The LOC HP is designed for three microfluidic interface configurations: two interface configurations with the fluidic interfaces at the shorter sides of the microfluidic chip and one at the longer sides, addressing openings with a 4.5 mm spacing exactly matching the spacing of a 384 well microtiter plate. With this, the LOC HP and the LOC CCI are compatible with many of our off-the-shelf microfluidic chips with Mini Luer and through-hole interfaces.

Through the fluidic interfaces, external pumps and valves can be connected via tubing with the microfluidic device without touching the device itself. The LOC HP can be upgraded to the Lab-on-a-Chip Cell Culture Incubator – LOC CCI 1 by the addition of a heating element.

The **Lab-on-a-Chip Cell Culture Incubator** – LOC CCI 1 enables to carry out cell-based assays in microfluidic chips placed in this incubator to be easily mounted on a microscope stage. Microfluidic chips can be directly placed in the frame that allows for the desired temperature on the chip due to integrated heating elements. The system is optimized for the laboratory standard of 37°C. The fluidic interfaces are directly integrated in the **Lab-on-a-Chip Cell Culture Incubator** – LOC CCI 1 to achieve an easy liquid supply and removal without interfering with the optical detection zone.

Various kinds of applications can be facilitated on chip with the help of the **Lab-on-a-Chip Cell Culture Incubator** – LOC CCI 1:

- Cell-based microscopy assays
- Long-term cell culture experiments (e.g. co-cultures, cytotoxic/ pharmacological effect analysis, cell migration and many more)
- Live cell imaging

Features that the **Lab-on-a-Chip Cell Culture Incubator** – LOC CCI 1 offers:

- Standard microtiter plate format; fits with all inverted microscopes having a 96 well plate holder or frame.
- Integrated heating system for excellent cell culture conditions - optimized for 37°C.
- For standard cell culture no additional gas incubation is necessary.
- Cell culture is comparable to standard CO_2-incubator.
- Compatible with all standard microscope slide formats
- Microfluidic interface integrated allowing for liquid handling for long-time assays without additional handling steps.

The fluidic operation of the **Lab-on-a-Chip Cell Culture Incubator** – LOC CCI 1 is done best with connected pumps.
For glass microfluidic chips the LOCHP/CC1 series is at hand.

Fig. 736: Complete setup of the Lab-on-a-Chip Cell Culture Incubator – LOC CCI 1 with temperature control unit

Fig. 737: Lab-on-a-Chip Cell Culture Incubator – LOC CCI 1 with interchangeable adapter plates

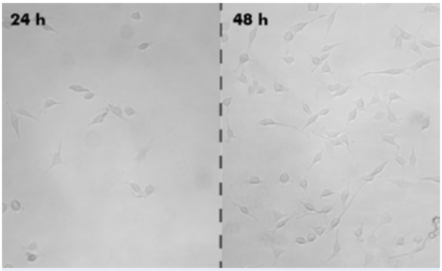


Fig. 738: HeLa Cells cultured and observed utilizing the Lab-on-a-Chip Cell Culture Incubator – LOC CCI 1.

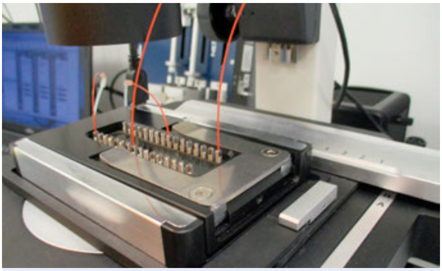


Fig. 739: Lab-on-a-Chip Cell Culture Incubator – LOC CCI 1 placed on a microscopy stage

Product Code	Description	Price [€] included adapter plate 2x8	2x16
10000287	LOC HP w/o heating elements (incl. 1 adapter plate of your choice)	1,808.40	
10000743	LOC CCI 1 with heating elements (incl. 1 adapter plate of your choice)	2,371.87	
10001216	Additional adapter plate	390.00	390.00

Product Code	Description	Price [€] included adapter plate 2x8	2x16
10000893	LOC HP w/o heating elements – handling frame for glass chips (incl. one adapter plate of your choice)	1,808.40	
10000699	LOC CCI 1 with heating elements – handling frame for glass chips (incl. one adapter plate of your choice)	2,371.87	
10001216	Additional adapter plate	390.00	390.00

Product Code	Description	Detail	Product Code	Price [€]
10001701	LOC-CCI 1 starter kit 1	- Male Mini Luer plugs, red, material: PP (10)	10000053	638.32
		- Rhombic chamber chip, 120 µl chamber volume, 500 µm channel depth, hydrophilized, material: Topas (10)	10000244	
		- Rhombic chamber chip, 100 µl chamber volume, 600 µm channel depth, hydrophilized, material: Topas (10)	10000405	
		- Rhombic chamber chip, 250 µl chamber volume, 800 µm channel depth, hydrophilized, material: Topas (10)	10000365	
10002004	LOC-CCI 1 tool kit	- Mini Luer interfaces (16) - O-rings (16) - PEEK tube (1.5 m) - PTFE tube (1 m) - Silicone tube (1 m)		229.00

11.2 DropBot – Digital microfluidic control system

DropBot by *Sci-Bots* is a portable, general-purpose Digital Microfluidic control system that can be used to manipulate discrete droplets using electrostatic forces on an insulated array of electrodes; a format also commonly referred to as **Electrowetting on a Dielectric (EWOD)**. This small and rugged instrument can be controlled via USB with easy-to-use software that supports graphical programming (i.e., users can simply click and drag drops using a real-time video overlay). Sequences of steps can be pre-programmed and run automatically, enabling fully automated operation.

Features:

- Integrated high-voltage source (up to 140 VRMS bipolar square waves at frequencies between 100 Hz–10 kHz)
- 120 independent channels connected to the chip via spring loaded pogo-pins
- Dynamic impedance sensing providing real-time measurement of drop position/velocity
- Extensible software supports easy integration/control of new sensors and actuators via plugins

Applications:

- Sample preparation
- Immunoassays
- Chemical synthesis
- Cell-based assays
- Adherent
- 3D cell culture

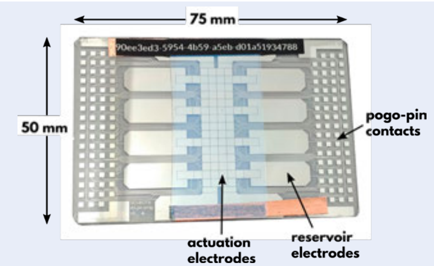


Fig. 740: Footprint and general layout of the electrowetting platform

Fig. 741: DropBot instrument for manipulation and read-out

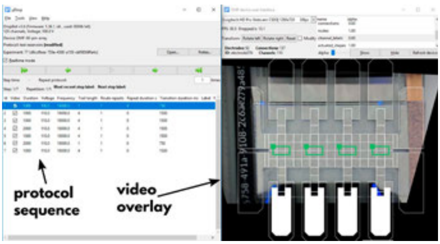


Fig. 742: MicroDrop – the Graphical User Interface

Product Code	Description	Price [€/piece] 1+	10+
10001222	DropBot Starter Kit	6,999.00	
10001133	Generic glass DMF Chip	119.90	115.50

11.3 *M2-Automation* - Microdispensing Instrument

Based on long-term experiences, we recommend *M2-Automation* as partner for easy to use and robust micro-dispensing (spotting) solutions. For the highest accuracy we endorse using their microdispensers from the iTWO™ series, in particular instrumentTWO-300P, in order to start right away with your own spotting tasks.

Besides the possibility to purchase *M2-Automation's* devices, *microfluidic ChipShop* also offers **spotting services** for customized arrays. From trial to volume production; do not hesitate to contact us and benefit from our long experience in the manufacturing of integrated microfluidic devices.

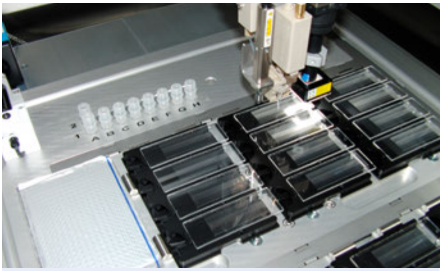


Fig. 743: M2-Automation instrumentTWO-300P in action

Fig. 744: instrumentTWO-300P spotting in microfluidic devices DNA-Array embedded in a microfluidic channel

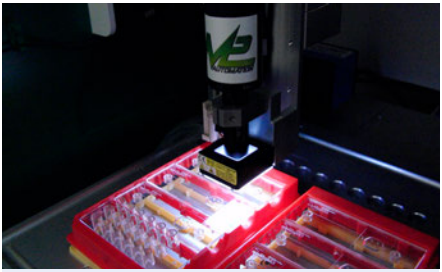


Fig. 745: M2-Automation instrumentTWO-300P

Fig. 746: instrument TWO-300P spotting in microfluidic devices DNA-Array embedded in a microfluidic channel

instrumentTWO 300P is a precise and versatile liquid handling solution with a high and flexible capacity for source and target plates.

Benefits at a glance:

- Precision of 5 µm for high density arrays
- 4 MTP sized positions for source or target holders (cooling or heating possible) spottable area of 220 x 300 mm
- Volume range from pl to ml
- Automated target and microarray imaging
- Optional climate-controlled conditions such as temperature, humidity and HEPA filter system
- Flexible deck configuration

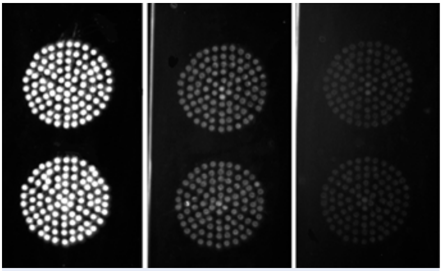


Fig. 747: Spotted fluorescent probes (spot diameter 80 µm) in a one channel Luer chip. Concentrations (left to right) 100 ng/µl, 10 ng/µl, 1 ng/µl

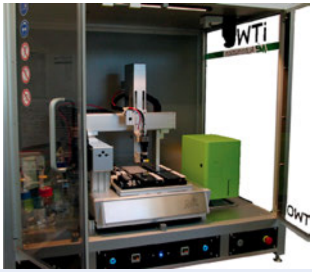


Fig. 748: instrumentTWO-300P

Non-contact and contact dispensing within one hybrid system: M2-Automations novel Quattro-Jet Technology combines **four different microdispensers** in one single instrument:

- Piezo driven Micro-Dispenser: For pico- to low nanoliter applications (30 pl+; c.v. 2%)
- Solenoid driven Micro-Dispenser: For nano- to low milliliter applications (30 nl+; c.v. 10%)
- M2-Micro-Dispenser: For low nano- to low milliliter applications (10 nl+; c.v. 2%) different versions available
- Pin Driven Micro-Dispenser: Pin head for split, hollow or solid/blunt end pins

By adjusting the dispensing parameters, the user can optimize droplet flight path, velocity and volume, ensuring accurate placement of features onto the substrate.

The spotter features an accurate (± 5 µm XY precision) motion system together with a unique positioning system of the substrate trays. The instrument comes with a specialized software called InDot, which is the result of more than fifteen years' experience in micro-dispensing and arraying; guiding the user easily through all features such as target layouts, array formatting, reagent and volume settings.

Technical data:

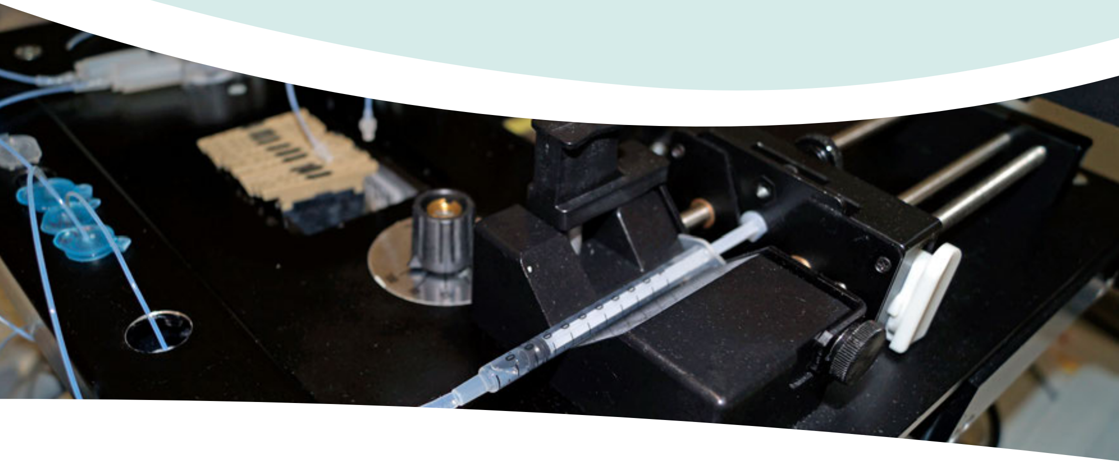
- Capacity: 30 slides/4 MTPs/16 vials or 1 planar target holder (available for wafers or membranes)
- Dispense modes: direct dispensing, aspirate (air gap possible for PDMD); dispense out of large volume source vials; resuspend samples; pin dispensing mode
- Resolution: < 1 µm
- Positioning of repeatability: < 5µm
- Maximum positioning velocity up to 20 spots deposition per second
- Maximum speed: X = 700 mm/s, Y = 800 mm/s, Z = 400 mm/s
- Maximum drive range: 250 x 300 mm, Z= 100 mm
- Self-contained pneumatic system

Product Code	Description	Price per instrument [€]
10001260	instrumentTWO-300P spotter	on request

CPP1

Extended Micropump Control
Freq.
Signal
Amp.
Off /On
Save
Bartels

12 Pumps and pressure controllers



Pumps and pressure controllers

For most microfluidic experiments, external systems to actively move liquids are needed. Depending on the application, different methods to actuate the fluids are available. In principle, one can differentiate between pumps and pressure controllers. Pumps such as syringe or peristaltic pumps shown in the following pages generate a constant flow rate while pressure generators generate a constant pressure by pressurizing a reservoir which is connected to the microfluidic device. We have selected a range of instruments to be able to offer the best solution for a given application.

12.1 MicCell Fluid Processor

An ultra-flexible system for controlling any microfluidic setup is *GeSiM's* modular FluidProcessor with its embedded CPU and graphical user interface. Select from a library of functional modules for fluidic and pneumatic control and/or include devices from other companies.

The FluidProcessor features device slots of standardized width. Modules (valves, syringe pumps, pressure/temperature control etc.) occupy 1 to 3 slots and slide in from the front or the rear. Slots 1 and 10 are narrower and slots 11 and 17 reserved for Ethernet connection, power and fans. It can be easily reconfigured.
The system is built to order, so outline your application, select functional modules of interest, and your FluidProcessor will be designed with all accessories such as internal/external tubes, filters and reservoirs. Various fittings are available. The tubing scheme and, if applicable, protocols to drive the unit will be sent to the customer before it leaves the factory. The FluidProcessor is shipped with the *GeSiM* Fluidics software.

12.1.1 Fluid Processor Modules

Several of the functional modules are shown below.

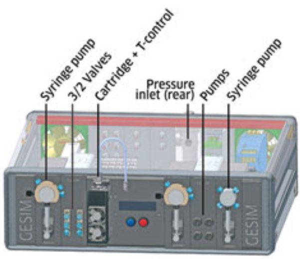


Fig. 749: Example of a FluidProcessor for biosensor-based wastewater analysis (ANTHROPLAS project)

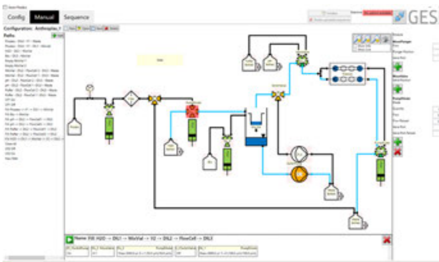


Fig. 750: Fluidic scheme used in a project for wastewater analysis (ANTHROPLAS project)

Among the modules you can find diluters with non-distribution and distribution valves (see below), two 3/2 valves, two diaphragms pumps for bulk fluidic handling, vacuum module (external vacuum required), liquid level sensors, pressure regulators for low and high pressure (compressed air required) and a cartridge cooler with pressure control for paste extrusion (pressure regulator required). Not all modules are shown. Please inquire for details.

Tecan syringe pumps, also called diluters, are capable to aspirate (e.g. from a reservoir) as well as push liquid through microchannels, with syringe sizes between 50 μl and 5 ml (50, 100, 250, 500, 1000, 2500, 5000 μl) and different gasket materials, e.g. PTFE. A 50 μl syringe and 24000 steps per full stroke exemplarily result in 2 nl volume pumped per step.

The syringe pumps work with ceramic or plastic valves. One can distinguish between two types:

- Distribution valves: connect the syringe with one of the ports by turning the valve. Available are 3-port, 4-port, 6-port, 9-port and 12-port distribution valves.
- Non-distribution valves: any of the ports can be connected with any other. For the 3-way valve shown above, this means that you can connect the syringe with port 1 or port 2, but also port 1 with port 2 and bypassing the syringe. The following non-distribution valves exist: 3-port, 4 port, 4-port dual loop, also T- and Y-junctions.

If additional pumps are needed an extra housing can be used.

It is possible to employ only the valve function (without syringe) to direct fluid to a certain outlet. In this case, connect a tube directly to the port that is normally occupied by the syringe. It may also be necessary to leave slots next to large valves unoccupied or there is only limited access to the valve ports.

Third-party devices (e.g. pulsation-free micropumps) can be hooked up to the FluidProcessor as well.

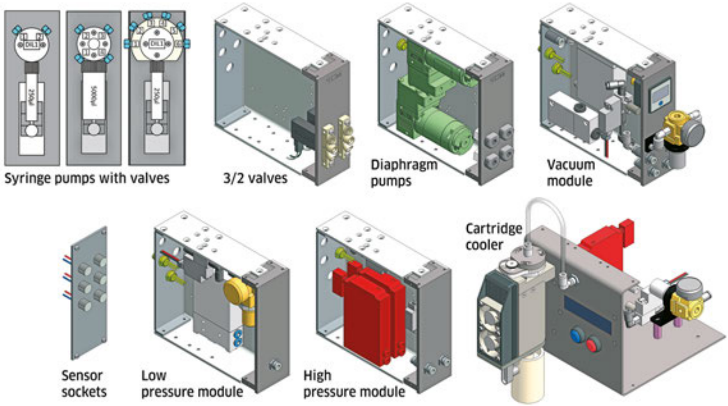


Fig. 751: Modules used in the FluidProcessor

12.1.2 The Software: *GeSiM Fluidics*

The Fluid Processor control software can be easily configured, thus corresponding exactly to the hardware on your bench. *GeSiM Fluidics* offers three 'pages':

- Configuration: Hardware modules and tube connections are selected from a library of modules and arranged by clicking and dragging.
- Manual: After initialization, hardware components can be operated by mouse click.
- Sequence: Create, save and execute complex sequences, including conditional branch instructions and loops, for unattended operation.

The MicCell Fluid Processor is a fully customizable fluidic control system. The platform offers customers the ability to easily configure an instrument, tailored to their needs for the precice operation of a microfluidic flow cell. You can choose from a wide variety of standard modules, either directly from *GeSiM Fluidics* or from many other commercial manufactures.
For more information or to get an individual quote for your fluidic system, please reach out to us.

Product Type	Configuration	Configuration	Price [€/instrument]
MC FluidProcessor, customized - Example -	• Chassis with PLC module and power supply • Dlutor module • Valve for smart valve+, 6-port distributor •Vacuum module • 2x Low pressure module • 6-fold Level sensor connector • 2-fold Level sensor connector • Temperature controller • Bottle rack, 1 Litre, with bottle • Flow sensor kit SLI-1000 • Electronic/ fluidic accessories	Customized MicCell FluidProcessor Other customized Flu-idProcessors available	please inquire

12.2 Cellix Pump Systems

Cellix offers precision microfluidic pumps for a wide range of applications. Key features and benefits of these microfluidic pumps include:

- Pulse free syringe pumps
- Single and multichannel control
- Multiple independent channel pumping
- Patented active flow control for accurate sample delivery
- Simple, easy-to-use control via iPad or PC
- Ideal for microfluidics, shear stress, precision mixing and cell culture studies.

12.2.1 ExiGo™ Microfluidic Syringe Pump with iPad control

ExiGo™ pump is a microfluidic syringe pump controlled by an iPad. Suitable for numerous microfluidic applications, precise multichannel mixing, electrophysiology, single cell analysis, analytical biochemistry and RNA/DNA analysis.

Features:

- Precise flow control with active feedback via plug-and-play flow sensor (optional add-on)
- Flow rate: 10 nL/min–2 0mL/min ±0.5%
- Standard syringes: 100 µL–5 mL
- Wash mode or programmable perfusion mode (constant, ramp, step, sine) with reversible flow direction
- Rapid flow change (ms range)
- Excellent long-term flow stability
- iPad or PC (LabVIEW, Matlab, Python etc.) control which can control/program up to 4 pump modules independently
- Wi-Fi communication
- Use standard tubing for connection to any microfluidic biochip

Fig. 752: ExiGo™ Pump, controlled by iPad

Fig. 753: iPad App SmartFlo App on iPad for ExiGo™ / UniGo™ pumps

12.2.2 ExiGo™ Manifold

The ExiGo™ manifold is a specialised microfluidic channel selector designed to work with an ExiGo pump. The manifold allows the ExiGo pump to direct fluid to one of three microfluidic channels at a time. Accurate flow switching and low dead volume provide exceptional performance.
The ExiGo manifold can be programmed to automatically switch between fluidic channels using the SmartFlo PC software.

The ExiGo Manifold is an extremely useful tool for applications which require:
- Automatic refilling of the syringe
- Asynchronous injection of a reagent in multiple channels
- Continuous perfusion over long periods of time

Fig. 754: Manifold for refilling syringe or switching reservoirs: optional accessory for ExiGo™ pump

Fig. 755: ExiGo™ pump and attached manifold

12.2.3 UniGo™ Pump

UniGo™ microfluidic pump is a precision, microfluidic, single-channel pressure pump for a variety of microfluidic applications, where accurate and stable flow rate delivery is required. The pressure pump component is based on controlled air injection. The UniGo pump requires a plug-and-play flow sensor for active feedback and increased flow control. SmartFlo application executed on the iPad or LabVIEW based interface communicates with up to 4 UniGo microfluidic pumps racked together allowing simultaneous control and independent programming of each pump's flow profile.
Uniquely, the UniGo pressure pump may be docked together with the ExiGo microfluidic syringe pump combining the best features of both UniGo and ExiGo in one microfluidic set-up.

Features:
- Precise flow control with active feedback via plug-and-play flow sensor (compulsory add-on)
- Flow rate: 1 µL/min–1 mL/min; unidirectional (push)
- Wash mode or programmable perfusion mode (constant, ramp, step, sine) with reversible flow direction
- iPad or PC (LabVIEW, Matlab, Python etc.) control which can control/program up to 4 pump modules independently
- Use standard tubing for connection to any microfluidic biochip
- Internal and/or external compressor options

Fig. 756: UniGo™ Pump

12.2.4 Kima™ Pump

Kima[TM] pump is a microfluidic recirculating pump controlled by an iPod Touch or PC. Suitable for continuous microbe and cell culture under shear flow mimicking physiological flow in the human vasculature. Applications include biofilm studies, cell culture in biochips with adherent cells (HUVECs), stem cells, HepG2 cells.

Features:
- Fits inside standard CO2 incubator maintaining temperature, humidity etc
- Recirculating long term perfusion pump
- There are two pump modes : Wash mode or perfusion mode
- Dead volume: <300 μL
- iPod Touch or PC control option which can control up to 4 pump modules independently
- Wi-Fi communication
- Includes tubing kit for Vena8 biochips or alternative tubing kits for other biochips available

NOTE: the Kima pump is not suitable for shear stressed based assays because the pump delivers liquid in pulses (not continuous flow).

Fig. 757: Kima pump, controlled by iPod Touch

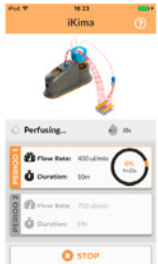


Fig. 758: iKima app for Kima pump showing perfusion

12.2.5 Mirus Evo Pro™ — PC Controlled via VenaFlux Assay Software

Mirus Evo Pro is a microfluidic syringe pump PC controlled via VenaFlux assay software. Suitable for microfluidic applications, single cell analysis and cell analysis under shear flow in biochips mimicking physiological flow in the human vasculature. Compatible with cell suspension samples and whole blood samples.

Features:
- Includes MultiFlow8 for precision flow splitting with equal flow rate in each channel
- MultiFlow8 contains 8 valves which can be switched on/off independently
- Higher throughput enabling 8 assays in parallel
- Patented flow damper to decrease syringe pump pulses
- Flow rate: 100nl/min - 20μl/min with 100μl syringes. Increased flow rates possible with larger size syringes
- Dead volume: ~600 μL
- Flow direction reversible
- PC controlled via VenaFlux assay software

Fig. 759: Mirus Evo nanopump with MultiFlow8: controlled by PC software, VenaFlux assay (included)

Product Code	Description	Price [€/instrument]
10001245	ExiGo™ pump; 1 x LabVIEW for PC; 1 x tubing kit; power supply and cables	3,591.00
10001424	Manifold for ExiGo™ Pump	1,120.00
10000621	Kima™ pump; 1 x iPod Touch with iKima App; 1 x iPod Dock (controller); 1 x tubing kit; 1 x 100mL bottle with GL45 cap; power supply and cables; Velcro strips to secure iPod Dock to CO2 incubator	2,995.00
10001246	Kima™ pump; 1 x tubing kit; 1 x 100mL bottle with GL45 cap; power supply and cables	1,895.00
10001247	MIRUS-PUMP-EVO, 1x syringe pump; 1x MultiFlow8; 1x VenaFluxAssay Software; 1 x tubing kit; power supply and cables	9,595.00

12.3 FLUIGENT – Ultraprecise Fluid Control Systems

FLUIGENT is an international company which develops, manufactures, and supports the most advanced fluid control systems available for microfluidics. Whether the application is with droplets, cell biology, particle studies, or in other research areas, we have the expertise and knowledge to provide the most cost-effective and technically advanced solutions to your fluid control needs. FLUIGENT manufactures state-of-the-art, integrable modules to manage fluids for OEM developed systems.

Software

OxyGEN

OxyGEN is FLUIGENT's universal software interface with hot plug and play capabilities, available for all desktop OS, that allows to control, monitor, and automate all FLUIGENT's products. Through its brand-new intuitive dashboard, **OxyGEN is a reference tool for real-time control and scheduled protocols** with commands and conditions focusing on pressures, flow rates, volumes, and valve actuation in microfluidic experiments, recording permanently all experiment parameters.

Software Development Kit (SDK)

FLUIGENT enables the **full integration of its instruments in different environments** like Python, LabView, Matlab, C++ etc. Thanks to its user-friendly Software Development Kit. Both software packages are available for free at fluigent.com!

The main **advantages of the technology** are

pulsation-free flow (no mechanical moved parts in the liquid path)
fast response time thanks to the feedback loop
easy handling of reservoirs of variable sizes at the same flow stability
easy sequential distribution of multiple liquids with only one pressure controller and a rotary valve
wetted parts at low cost, highly chemical resistant and the easily washable
compact size, even for 8 channels

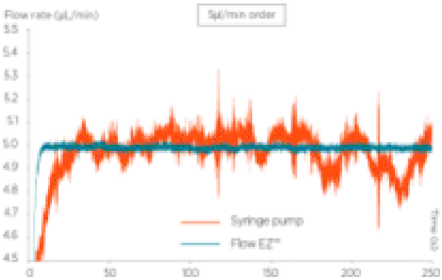


Fig. 760: **High Stability**

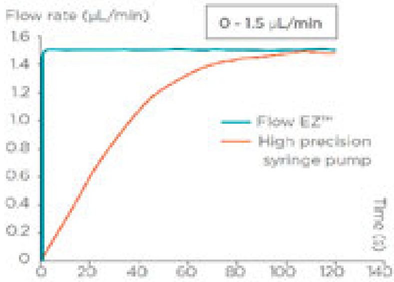


Fig. 761: **High Responsiveness**

Overview of FLUIGENT's Pressure Controllers

Research

	Flow EZ	**MFCS EZ**	**MFCS EX**
Field of application	High versatile research tool to be combined in the LineUp chain with valve control, flow rate sensors of multiple technologies, pneumatic valves	4 channels controller for research applications	8 channels controller for multiplexed research applications as OOC

OEM

OEM	**POEM**	**F-OEM**	**PX**
Field of application	OEM pressure controller from 1 to 8 channels with a high degree of customization	OEM product line with up to 4 pressure controllers, flow rate sensor and valve connection capabilities	Single pressure control module for OEM applications in a harsh environment.

Flow Rate Measurement

Our flow rate sensors enable both the monitoring, and the control of the flow rate through a complex feedback loop (DFC, for direct flow control). 2 sensor types (Flow Unit and FS+ Series) are in the fluidic line and therefore fast reacting. The Non-Invasive Flow Sensor NIFS is placed in the pneumatic, avoiding any possible contamination.

Flow Unit


FS + series

NIFS

Flowrate sensors	Model	Flowrate range	Wetted materials	Innerdiameter
Flow Unit	XS	7nL/min to	Glass and PEEK	25 µm
	S	To 7 µl/min	Glass and PEEK	150 µm
	M	To 120 µl/min	Glass and PEEK	430 µm
	L	To 1 ml/min	Glass and PEEK	1.0 µm
	XL	To 5 ml/min	Glass and PEEK	1.8 µm
FS+ series	M+	2 ml /min	PPS, stainless steel, epoxy	400 µm
NIFS	L+	0 to 40 ml/min	PPS, stainless steel, epoxy	1.4 µm
		100 µL/min to 10 mL/min	No wetted material since sensor in the pneumatic line	

Pressure sensors
Inline Pressure sensors (IPS)

The pressure unit is a **stand-alone microfluidic in-line pressure sensor** for continuous measurement of pressure in a fluidic path. The product line can detect values **over the range of -1000 mbar (-15 psi) to 7000 mbar (100 psi)**. The sensor can be directly connected to a PC via USB and can display measurements in real time on the **FLUIGENT OxyGEN software** interface. Users can output values for custom software applications using the Software Development Kit.


IPS

pressure sensors	**S**	**M**	**XL**
Pressure range (measure-ment)	-345 mbar to 345 mbar	-1000 mbar to 1000 mbar	-1000 mbar to 7000 mbar
Maximum overpressure	1380 mbar	3100 mbar	13800 mbar
Accuracy mean (% of max range)	2 to 3 mbar 0.6% typ. to 0.9%	10 to 20 mbar 1.0% typ. to 2.0%	16 to 40 mbar 0.3% typ. to 0.6%
Zero shift	6.9 mbar (2% span)	10 mbar (1% span)	70 mbar (1% span)
Repeatability/ Hysterisis	1.4 mbar (0.4% span)	2.0 mbar (0.2% span)	14 mbar (0.2% span)
Measurement sampling	40 ms	40 ms	40 ms

Valves

Microfluidic valves, also called microvalves, are basic components used in microfluidic **devices to handle liquids through different valve ports**. FLUIGENT microfluidic valves allow users to direct and control the flow of fluids or gases. The valves can be easily integrated in the **set-up and controlled in real-time, even without the requirement of a PC**.

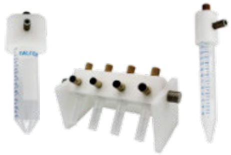


Switches	**2-Switch**	**M-Switch**	**L-Switch**
Number of ports	3-port/2 position	11-port/10-position	6-port/2-position
Application	With Standard Fittings in any microfluidic setup	Multiplexing or de-multiplexing up to 10 fluids. Sequential injection or distribution to multiple targets	For liquid recirculation in cell culture applica-tions. Precise volume injection

Accessories

Sample Reservoirs

FLUIGENT developed air-tight caps dedicated for microfluidic experiments with sample pressurization at different levels and on various volume sizes. The product range is standardized for common laboratory vials & bottles.



Fluiwell series:
Pressurized fluid reservoir

P-CAP series:
Air-tight metal cap

Bottle Cap Series: Pressurized Bottle CAP

Pressure Sources

Our set of pressure and vacuum sources have been carefully developed to supply FLUIGENT whole product range with optimized performance.

Pressure Sources	Microfluidic Low Pressure Generator	Fluigent RX	Vacuum Source
Maximum output pressure	2.3 bar	2500 mbar	-1000 mbar
Maximum airflow-rate	3.2 L/min under 2.1 bar or 2.0 L/min under 1.1bar	2500 mbar	0 mbar
Output capacity (high pressure version)	2 bar: up to 8 channels/1 bar: up to 16 channels	0,8 L/min	0,7 L/min
Output capacity (silent pressure version)	2 bar: up to 4 channels/1 bar: up to 8 channels	5,6 L/min	
Dimensions	1800 x 160 x 270 mm	106 x 96,5 x 61,5 mm	156 x 119 x 75 mm

Bubble trap

The Bubble Trap from FLUIGENT is a device suitable for aqueous stream flows, perfectly fit to prevent air bubbles from entering a microfluidic system.

Bubble trap

Highly stable fluorosurfactant (dSurf)

dSURF is a high-performance surfactant suited to produce highly monodisperse and stable microdroplets. Provided at 2% in 3M™ Novec™ 7500 fluorinated oil, dSURF allows high-performance droplet formation and long-term stability even in challenging conditions such as dPCR and cell culture experiments.

dSurf

Applications

A one-of-a-kind innovative Organ-on-Chip Platform: OMI

Omi is an automated platform that helps reproduce the microphysiological behavior of organs inside microfluidic chips. It is compatible any type of chips to sustain different cell culture types or organ on chip models (liver, gut, skin…). It is possible to sample up to 4 mL in the culture medium for analysis or imaging and to inject up to 4 mL of fresh medium during the experiments.

OMI	Features
Compact and transportable	The device is designed to fit in incubators and can be easily transported to a microscope for imaging or cell analysis while maintaining perfusion.
Remote control	Set up and monitor the protocols on Omi's application's user-friendly interface with WIFI.
Contamination-free	inject cell or fresh medium, deliver test compounds, collect samples without disconnecting the microfluidic chip and disturbing the shear stress conditions of the experiments.
Completely autonomous platform	2-hour battery allows for transport from incubator to imaging system.
Perfusion	Perfuse up to 4 mL of several types of liquids such as cell culture media for a long period of time in a controlled and reproducible way. The stability and precision of the perfusion allow control of the shear stress throughout any experiment.
Recirculation	Unidirectional recirculation of medium while maintaining a constant flow rate for a long period of time.

Automated Sequential Injection System: Aria

Unique solution for automating perfusion imaging studies.

You do the Science, Aria does the rest.

AIRA is a compact instrument to **automate multiple fluid perfusions**. It allows the user to set **up a custom time schedule** for exposing cells, nucleic acids, etc. to antibodies, chromophores, test compounds, or other liquids. The Aria allows one to **automate delivery of up to 10 different solutions** into a chamber or microfluidic chip by following user defined protocols. The Aria drastically reduces **variability down to 0.5%** between experiments compared to 5.1% intra-operator variability and 8.1% inter-operator variability using a pipette.

Contamination free: the sample is delivered at the beginning of the experiment and is not touched during the protocol, minimizing contamination risks from manual operations. This results in controlled and smooth flow preserve samples compared to traditional pipetting.
The Aria can synchronize with various microscopes using **TTL signaling**. The device can send and receive TTL signals to start an imaging cycle, or to resume the Aria injection protocol when an imaging cycle is completed. Aria's software comes with a dark mode to work in an imaging room and is equipped with LED'S to facilitate use in dark areas. A TCP/IP protocol for software integration is also available.

	Pipette	**Aria**
Type of injections	Abrupt injections (up to 1mL in few seconds) Disparate injections Turbulent flow	Smooth and controlled injections Identical injections Laminar flow
Geometry at injection tip	Conic shape: high shear stress Unhomogenous fluid velocity	Straight shape: No modification at the injection tip

OOC: 8 Channel platform

This cell perfusion pack has been designed for **high throughput experiments**. The compactness and arrangement of the different elements have been optimized **to perfuse a maximum number of chips and then grow multiple organ models at the same time in an incubator**. It includes an **8-channel compact pressure controller**, a flow rate platform, and reservoir holders directly adapted on an incubator trail.

Droplet Pack

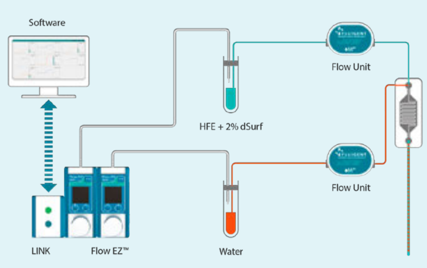
Together with FLUIGENT we designed the Droplet Starter Pack for all who want to start experiments with microfluidic droplets. It includes the Droplet generation - Droplet variation kit and fully adapted liquid handling solution and accessories. This setup is ideal to create droplets with e.g. a single cross, flow focusing droplet generator. Here is what your droplet generation setup will contain:

Microfluidic Pressure Pumps - LineUp Flow EZ™:
- Highly advanced system for pressure-based flow control
- Stand-alone units for use near the microfluidic setup
- Independent control flows of disperse and continuous phases
- Available in a variety of pressure ranges from - 800 to + 7 000 mbar

LINK:
- Provides connection of LineUp Flow EZ™ series modules to a PC for software control

Flow Units:
- Flow sensors that allows real-time flow rate measurements
- Enables to switch from pressure control to flow rate control
- Guarantee reproducibility of long-term droplet production

All-in-One (A-i-O) control software:
- Real-time control of pressures and flow rates
- Modular interface
- Independent monitoring of all parameters for each connected channel



Schematic drawing of a microfluidic system used for droplet generation

Droplet generation setup with droplet generator chip - on microscope - and Fluigent pressure-pump set-up

Product	Content	Price [€]
Fluigent pump setup for droplet generation with two individual flow channels	LineUP Flow EZ™ modules (2x), LineUP LINK module, LineUP power supply kit, Pressure CAP for 15 ml tubes (2x) with support rack (1x), Flow Unit S (0-7µL/min for water or 0-70µL/min for hydrocarbons) (2x), A-I-O software, Droplet generation - Droplet variation kit (product code 10001653)	10,940.18

12.4 Microdispenser and Rotary Valves by Advanced MicroFluidics

12.4.1 LSPone – Laboratory Sequential Microdispenser

The LSPone micropump is a high-precision dosing system that can manage sampling, sequential injection, dosing, dispensing, recirculation, mixing, and temperature control operations and automation. Compact, robust and self-cleaning fluidic automation is now achievable.

Thanks to its zero dead volume valve, the LSPone is more accurate, easier to clean and reduces cross-contamination, compared to standard laboratory sequential pumps.

With a single LSPone syringe pump, you will obtain a high degree of flexibility and automation: this microdispensor can replace a complex system with multiple pumps, valves, sampling loops and cumbersome cleaning systems, thus drastically simplifying your automation and making you gain precious time as well as reduce your reagents budget.

You can choose the perfect configuration for your setup by selecting the correct valve and syringe. Please note that all syringes and valve heads are interchangeable.

Customization possibilities include
- Syringe and valve heads design
- Wetted materials
- Fluidic fittings
- Fluid path diameter
- Number of ports

Fig. 762: LSPone laboratory sequential microdispenser

Product Code	Description	Price [€/instrument]
10001248	LSPone laboratory sequential microdispenser Includes: power cord, mini USB, syringe change tool, software	3,251.00

Syringes - Specifications

Product Code	Reference	Plunger material	Min. flow. rate	Max. flow rate	Min. dosing volume	Price [€/piece]
10001393	S-25-P	PTFE	0.25 µl/min	750 µl/min	0.05 µl	172.00
10001394	S-50-P	PTFE	0.5 µl/min	1500 µl/min	0.1 µl	172.00
10001395	S-100-P	PTFE	1 µl/min	3000 µl/min	0.2 µl	155.00
10001396	S-100-U	UHMW-PE	1 µl/min	3000 µl/min	0.2 µl	155.00
10001397	S-250-P	PTFE	2.5 µl/min	8000 µl/min	0.5 µl	155.00
10001788	S-500-U	UHMW-PE	2.5 µl/min	8000 µl/min	0.5 µl	155.00
10001398	S-500-P	PTFE	5 µl/min	15000 µl/min	1 µl	155.00
10001789	S-500-Q-P	PTFE	5 µl/min	15000 µl/min	1 µl	155.00
10001399	S-500-U	UHMW-PE	5 µl/min	15000 µl/min	1 µl	155.00
10001400	S-1000-P	PTFE	10 µl/min	30000 µl/min	2 µl	155.00

Valve - Specifications

Product Code	Reference	Configuration	Wetted materials	Internal volume*	Carry-over volume**	Fluid path diameter	Max. pressure	Price [€/piece]
10001401	V-D-2-6-050-C-P	Ultra-low carry-over volume	PCTFE, PTFE	5.2 µl	1.5 µl	0.5 mm	7 bars	267.00
10001402	V-D-1-6-050-C-P	Low carryover volume	PCTFE, PTFE	3.5 µl	2.6 µl	0.5 mm	7 bars	247.00
10001403	V-D-1-8-050-C-P	Low carryover volume	PCTFE, PTFE	3.5 µl	2.6 µl	0.5 mm	7 bars	252.00
10001404	V-D-1-8-100-C-U	Low carryover volume	PCTFE, UHMW-PE	18.1 µl	11 µl	1 mm	7 bars	375.00
10001405	V-D-1-10-050-C-U	Low carryover volume	PCTFE, UHMW-PE	4.5 µl	2.8 µl	0.5 mm	7 bars	385.00
10001406	V-D-1-10-100-C-U	Low carryover volume	PCTFE, UHMW-PE	18.1 µl	11 µl	1 mm	7 bars	385.00
10001407	V-D-1-12-050-C-U	Low carryover volume	PCTFE, UHMW-PE	4.5 µl	2.8 µl	0.5 mm	7 bars	395.00
10001790	V-D-1-12-050-C-P	Low carryover volume	PCTFE, PTFE	4.5 µl	2.8 µl	0.5 mm	7 bars	366.00
10001791	V-D-1-12-080-C-U	Low carryover volume	PCTFE, UHMW-PE	11.6 µl	2.8 µl	0.8 mm	7 bars	395.00

* volume inside the system, from entrance to exit
**volume that will be flushed next time a liquid passes (cross-contamination)

12.4.2 RVM – Microfluidic Electric Rotary Valve

This OEM valve is a precise low-pressure electric rotary valve designed for automated microfluidic applications.Its exceptionally small channels and accurate positioning system make it ideal for precise liquid handling.

There is a wide possibility to customize your RVM with choice of the microfluidic valve design, material, channel diameter, and number of ports. It is also possible to customize the motor type: A low power model exists for a minimum battery use and a fast one exists for your time-specific applications. Please note that valve heads are interchangeable.

Customization possibilities include

- Wetted materials
- Valve head interchangeable
- Fluidic fittings
- Fluid path diameter
- Motor
- Electrical interfaces
- Communication types
- Number of ports
- PCB

Fig. 763: Customizable electric rotary valve system

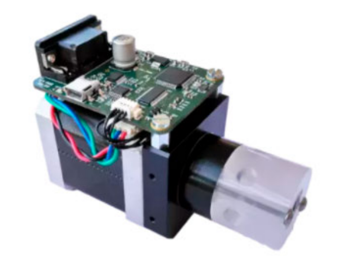


Fig. 764: Microfluidic electric rotary valves

Motor - Specifications

Product Code	Type	Power	Rotation time for 180°	Weight (total module)	Dimensions	Price [€/piece]
10001425	Low power motor	5-10 VDC, 0.5 A peak	1.5 s	250 g	29 x 38.3 x 11.8 mm	505.00
10001426	Fast motor	18-24 VDC, 2 A peak	400 ms	450 g	42.3 x 60 x 95.9 mm	451.00

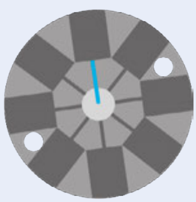


Fig. 765: ‚Distribution' valve type - also known as N-port distribution valve - and its liquid path (blue)

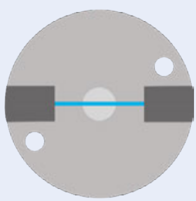


Fig. 766: ‚On/off' valve type - also known as shut-off valve - and its liquid path (blue)

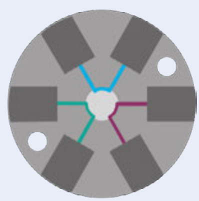


Fig. 767: ‚Switch' valve type - also known as loop valve - and its liquid paths (colored)

Valve - Specifications								
Product Code	Reference	Configuration	Wetted materials	Internal volume*	Carry-over volumes**	Fluid path diameter	Max. pressure	Price [€/piece]
10001427	V-D-1-6-050-C-P	6 ports Distribution	PCTFE, PTFE	2.5 µl	1.5 µl	0.5 mm	7 bars	247.00
10001428	V-D-1-8-050-C-P	8 ports Distribution	PCTFE, PTFE	2.5 µl	1.5 µl	0.5 mm	7 bars	252.00
10001429	V-D-1-8-100-C-U	8 ports Distribution	PCTFE, UHMW-PE	13.8 µl	6.7 µl	1 mm	7 bars	375.00
10001430	V-D-1-10-050-C-U	10 ports Distribution	PCTFE, UHMW-PE	3.5 µl	1.7 µl	0.5 mm	7 bars	385.00
10001431	V-D-1-10-100-C-U	10 ports Distribution	PCTFE, UHMW-PE	13.8 µl	6.7 µl	1 mm	7 bars	238.00
10001432	V-D-1-12-050-C-U	12 ports Distribution	PCTFE, UHMW-PE	3.4 µl	1.7 µl	0.5 mm	7 bars	395.00
10001793	V-D-1-12-050-C-P	12 ports Distribution	PCTFE, PTFE	3.4 µl	1.7 µl	0.5 mm	7 bars	366.00
10001794	V-D-1-12-080-C-U	12 ports Distribution	PCTFE, UHMW-PE	8.8 µl	4.3 µl	0.8 mm	7 bars	395.00
10001433	V-O-1-2-050-C-P	2 ports On/Off	PCTFE, PTFE	3.0 µl	-	0.5 mm	7 bars	168.00
10001434	V-O-1-2-050-C-P	2 ports On/Off	PCTFE, PTFE	6.6 µl	-	0.75 mm	7 bars	168.00
10001795	V-O-1-2-075-P-P	2 ports On/Off	PTFE, PTFE	6.6 µl	-	0.75 mm	7 bars	138.00
10001435	V-S-1-4-050-C-P	4 ports Switch	PCTFE, PTFE	2.8 µl	0.8 µl	0.5 mm	7 bars	173.00
10001436	V-S-1-6-050-C-P	6 ports Switch	PCTFE, PTFE	2.5 µl	0.6 µl	0.5 mm	7 bars	179.00

* volume inside the system, from entrance to exit

**volume that will be flushed next time a liquid passes (cross-contamination)

12.5 Micropumps from Bartels Mikrotechnik

Micropumps transporting the tiniest amounts of gases or liquids can be considered the heart of microfluidics. In many sectors they have become indispensable. Dosing lubricants, feeding fuel cells with methanol or mixing starch into the steam of flat irons are only a few of the manifold tasks they fulfill. Many further fields of application for example are located in medical technologies and analytics. Extremely small in size and low in weight, with good particle tolerance and temperature resistance, Bartels micropumps are well prepared to be used in any of these sectors. Produced almost entirely from plastic, these micropumps can be manufactured cost-effectively in high volumes. These piezo-driven membrane pumps are available in starter kits to quickly enable the user to familiarize themselves with the technology.

Key features of micropump-series mp6:

- 30 x 15 x 3,8 mm
- 2 piezo actuators
- 2 g weight
- Self-priming

Different pump sets are available to start with your microfluidic experiment using micropumps from Bartels Mikrotechnik right away!

The **mp-basic kit** contains everything you need to test the microfluidic pump in an active system. In order to be able to test the pump for its suitability, we designed the mp-Multiboard2 so that it can operate with simple handling steps.

You can equip the mp-Multiboard2 with integrated ESP32 microcontroller with all available drivers. This allows you to test from the lowest flow rate with one micropump up to six micropumps simultaneously. The available microfluidic driver chips are the mp-Driver, mp-Lowdriver, mp-Highdriver and mp-Highdriver4. You can use all drivers with the evaluation board and the software we developed. This allows for easy operation of the microfluidic pump. In the software, you can set the frequency, as well as the voltage. In addition, there is an integrated timer mode, whereby the microfluidic pump is specifically switched on and off. Due to the simple plug-in connections and cables, a flexible use of the micropumps with the mp-Multiboard2 is given. Tubing and hose clamps complete the mp-basic set. The tubing fits perfectly to the microfluidic pump and the other components. So, if you want to extend your system, you can easily do so.

The **mp-advance kit** contains everything you need for a complete microfluidic system: mp6 micropumps, all electronics including mp-Driver, mp-Lowdriver, mp-Highdriver and mp-Highdriver4, a microfluidic sensor and chip, valves and the valve driver and the associated accessories.

The **mp-Lab! kit** allows a quick and comprehensive initial test to clarify whether the mp6 micropumps are a useful addition for your laboratory application. With the laboratory electronics mp-Labtronix you act comfortably in laboratory applications with micropumps, but also for intensive test series or if you are not so familiar with the secrets of electronics. With this system specially designed for laboratory use, you can easily adjust the frequency, amplitude and the waveform on the knobs and toggle switches to achieve the desired change in the flow or pressure values of the micropumps. In this kit for laboratory applications, you will receive a USB cable to connect to your PC and a power cable for power supply as well as a mp6-con cable to connect the pump. The tubing as well as hose clamps are also included.

Fig. 768: mp-basic set

Fig. 769: mp-advance set

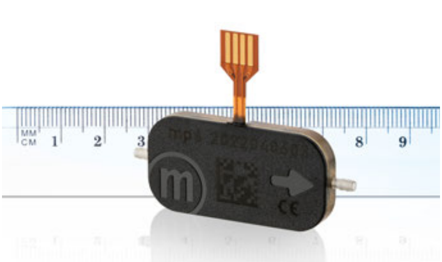


Fig. 770: Size of mp6 micropump

Fig. 771: Bartels mp-Lab! kit

Product Code	Description	Price [€/kit]
10001733	Bartels mp-basic set containing: • 6 x mp6 micropumps • mp-t tubing • mp-hc hose clamps • evaluation board: mp-Multiboard2 (including Micro-USB cable) and four driver chips: mp-Driver, mp-Lowdriver, mp-Highdriver, mp-Highdriver4	929.00
10001731	Bartels mp-advance Set incl. microfluidic chip • 6 x mp6 micropumps • mp-t tubing • mp-hc hose clamps • flow sensor(SLF3s-0600F) with connectors • mp-damper • preassembled pressure sensor • mp-valvedriver including 2 active valves • straight channel chip Fluidic 560 and Mini Luer connectors • evaluation board: mp-Multiboard2 (including Micro-USB cable) and four driver chips: mp-Driver, mp-Lowdriver, mp-Highdriver, mp-Highdriver4	1,569.00
10000841	Bartels mp-Lab! kit containing: • 3 x mp6 micropumps • mp-t tubing • mp-hc hose clamps • mp-Labtronix (including power supply, mp6-con cable, USB-cable)	999.00

12.6 Pumps and Pressure Controllers by CorSolutions

12.6.1 PeriWave Fluid Delivery Pump by CorSolutions

The CorSolutions PeriWave is the only pulseless, peristaltic pump on the market. It offers high performance peristaltic-based fluid delivery with integrated flow sensors and closed-loop feedback technology. As the pump measures the actual flow rate and provides the information back to the motor, smooth pulse-less flow, as well as programmable wave functions are possible. The pump's high performance derives from the fact that fluid is measured, as compared to syringe and traditional peristaltic pumps where only a mechanical motion is controlled. The pump provides pulseless flow, with fast response times and high accuracy. The PeriWave pump may be operated in a positive or negative flow direction. Since the pump is peristaltic-based, fluid may be recycled back to the fluid source container. This feature is particularly useful and cost-effective when delivering expensive cell culture media such as with cell/body/organ-on-a-chip applications. Additionally, the waveform control allows for the unique capability of shear flow cell growth experiments. PC software and LabVIEW VI are included with the PeriWave. Three flow models are offered with the following aqueous flow rate calibration ranges: Micro from 1 to 80 microliters per minute, Milli from 30 to 1000 microliters per minute, and Milli+5 from 0.2 to 5.0 milliliters per minute.

Fig. 772: CorSolutions PeriWave – the pulseless, peristaltic pump

12.6.2 PneuWave Fluid Delivery Pump by CorSolutions

The CorSolutions PneuWave pump is the only stand-alone, all-electric, pneumatic-based pump on the market, and can be operated with or without a computer. The PneuWave offers high performance with integrated flow and pressure sensors, allowing closed-loop feedback control. Additionally, the PneuWave has an integrated air compressor and a display screen for stand-alone operation. The user only needs to provide electricity and the fluid to be delivered! The pump records both flow and pressure information and allows users to input desired set-points or profiles as either flow rate or pressure parameters. The pump's high performance derives from the fact that fluid is measured, as compared to syringe and traditional pumps where only mechanical parameters are controlled, indirect of fluid performance. The pump provides pulseless flow with the fastest flow control performance available. The PneuWave comes in a 1 Bar or 4 Bar model. PC software and LabVIEW VI are included with the PneuWave. The PC software detects how many channels are connected and the flow regime for each, and automatically populates the user interface, allowing facile synchronization between multiple fluid channels. Three flow models are offered with the following aqueous flow rate calibration ranges: Micro from 1 to 80 microliters per minute, Milli from 30 to 1000 microliters per minute, and Milli+5 from 0.2 to 5.0 milliliters per minute.

Fig. 773: CorSolutions PneuWave pump with integrated flow and pressure sensors

12.6.3 PneuWave ECO Fluid Delivery Pump by CorSolutions

The CorSolutions PneuWave ECO pump is an economical alternative to the PneuWave. Although the performance remains the same, unlike the PneuWave, the ECO is PC control only and it requires an external compressed gas source. For constrained budgets, the ECO can also be purchased without flow control. In this case, the pump has only integrated pressure sensors (no flow sensors), and operates with only pressure closed-loop feedback. The PneuWave ECO comes in a 1 Bar or 4 Bar model, and includes both PC software and LabVIEW VI. Three flow models are offered with the following aqueous flow rate calibration ranges: Micro from 1 to 80 microliters per minute, Milli from 30 to 1000 microliters per minute, and Milli+5 from 0.2 to 5.0 milliliters per minute.

Product Code	PneuWave	PneuWave ECO With Flow Control	PneuWave ECO Without Flow Control
Stand-alone Operation	•		
PC Control	•	•	•
Does not Require External Compressor	•		
Flow Rate Mode	•	•	•
Pressure Mode	•	•	•
Fast Response	•	•	•
High Accuracy	•	•	•
High Precision	•	•	•

Fig. 774: PneuWave ECO Pump (left) and flow meter (right)

12.6.4 Flow Meters by CorSolutions

CorSolutions offers several styles of flow meters for measuring liquid flow rates. Three flow models are offered in each of these versions: Micro from 1 to 80 microliters per minute, Milli from 30 to 1000 microliters per minute, and Milli+5 from 0.2 to 5.0 milliliters per minute.

The **Standard Flow Meter** has a screen and interface buttons which displays the flow rate, and allows for stand-alone control. In addition, PC software and LabVIEW VI are included with the meter, allowing for computer control as well. The user is able to have the meter signal average for data smoothing if desired, and the user can select how frequently the flow rate value is recorded in the data file. The Standard Flow Meter comes with an aqueous calibration, and optional software for calibrating the meter for different liquid types is available.

Fig. 775: Flow Sensor Plus DSC

The **ECO Flow Meter** offers the same performance as the Standard model, but as it does not have a display screen and interface buttons, it can only be controlled through a computer. PC software and LabVIEW VI are included. The user is able to have the meter signal average for data smoothing if desired, and the user can select how frequently the flow rate value is recorded in the data file. The ECO Flow Meter comes with an aqueous calibration, and optional software for calibrating the meter for different liquid types is available.

Fig. 776: Flow meter

Fig. 777: 2-, 4-, 6-fold flow meter and sensor unit

The **Flow Meter Multi** offers a means of measuring flow rates of multiple fluid streams. The Multi consists of a single controller and a remote block containing two, three, four, five or six flow sensors. These sensors can be the same flow model, or alternatively, can be different flow models. Stand-alone or PC control is possible. PC software is included. When computer communication is established, the software detects the number of flow sensors present and the flow model of each, and automatically populates the display accordingly. The user is able to signal average for data smoothing if desired, and the user can select how frequently the flow rate values are recorded in the data file. Each flow sensor comes with an aqueous calibration, and optional software for calibrating the meter for different liquid types is available.

12.6.5 Microfluidic Connectors

The CorSolutions microfluidic connectors allow one to rapidly and easily establish a non-permanent, leak-tight connection to a microdevice. Connections are compatible with most substrate materials including plastics, glass, silicon and PDMS. This flexible, low dead volume approach can be used with a wide variety of tubing sizes and adapters.

12.6.6 Transparent Fittings by CorSolutions

Precision manufactured, transparent fittings allow for user observation of critical junctions. These fittings offer a window to notoriously problematic microfluidic connections, providing researchers a better understanding of their experiment. Fittings come in a variety of architectures, port styles, and inner diameters.

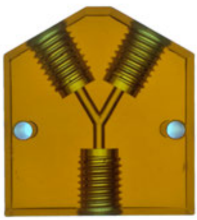


Fig. 778: CorSolutions microfluidic connectors – example of Y-1/4 28-1.0 design

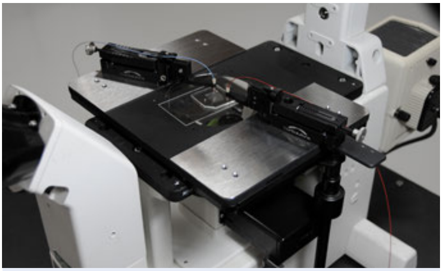


Fig. 779: Magnetic fluid scope

Product Code	Description	Detail	Price [€/instrument]
10001030	Pump	CorSolutions PneuWave pump with integrated flow and pressure sensors	Please contact for pricing
10001249	Pump	CorSolutions PneuWave ECO Pump	Please contact for pricing
10001250	Pump	CorSolutions PeriWave Pump	Please contact for pricing
10001251	Flow meter	CorSolutions Flow meter – Standard	Please contact for pricing
10001252	Flow meter	CorSolutions Flow meter – ECO	Please contact for pricing
10001253	Flow meter	CorSolutions Flow meter – Multi with 2 channels	Please contact for pricing
10001254	Flow meter	CorSolutions Flow meter – Multi with 4 channels	Please contact for pricing
10001255	Flow meter	CorSolutions Flow meter – Multi with 6 channels	Please contact for pricing

Product Code	Part Number	Architectures	Port Styles	Inner diameter	Price [€/piece]
10001022	U-1/4-28-1.0	Union	¼-28 Flat Bottom	1.0 mm	Please contact for pricing
10001023	U-1/4-28-1.6	Union	¼-28 Flat Bottom	1.6 mm	Please contact for pricing
10001024	Y-1/4-28-1.0	"Y"	¼-28 Flat Bottom	1.0 mm	Please contact for pricing
10001025	Y-1/4-28-1.6	"Y"	¼-28 Flat Bottom	1.6 mm	Please contact for pricing
10001026	T-1/4-28-1.0	"Tee"	¼-28 Flat Bottom	1.0 mm	Please contact for pricing
10001027	T-1/4-28-1.6	"Tee"	¼-28 Flat Bottom	1.6 mm	Please contact for pricing
10001028	X-1/4-28-1.0	Cross	¼-28 Flat Bottom	1.0 mm	Please contact for pricing
10001029	X-1/4-28-1.6	Cross	¼-28 Flat Bottom	1.6 mm	Please contact for pricing

12.7 Valving – *memetis* Shape Memory Miniature Valves

12.7.1 *memetis* Shape Memory Alloy (SMA) miniature valves

memetis offers a new generation of ultra-compact SMA valves. With its size, they are even suited for complex fluidic systems with a multitude of fluidic components.

Shape memory alloys (SMA) are metallic alloys that can easily be deformed in cold state. As soon as they are heated, for example by electric current, they return to their memory shape and thereby perform a movement.

The SMA valves have a very low power consumption and work at small voltages below 5 V. Together with the small size, the media separated valve is suited best for mobile applications in Life-Science. A width of only 5 mm simplifies the integration of many valves on smallest space. The valve has a very small internal volume of less than 4 µl leading to minimal reagent consumption. The wetted materials are fully biocompatible and its smooth, noiseless, yet fast switching performance is perfect for fluidic systems sensible to abrupt changes of fluid flow. Adding a flow-sensor the memetis miniature valve is capable of controlling the flow-rate.

A specifically designed control system ensures smooth and secure operation of the valves.

Fig. 780: *memetis* valve next to a pen for size comparison

Fig. 781: NC valves with PEEK housing

Fig. 782: *memetis* fluidic adpater with one valve

Fig. 783: Electronic control unit for one valve

12.7.2 *memetis* SMA valve evaluation bundles

memetis offers a dedicated evaluation kit for NC valves.

The control of the NC valves is simple: a current-regulated control system enables the valves to be switched from normally closed to open state. The valve's power consumption of 0.3 W is very low. When the current is switched off, the valve is closed again.

In the standard configuration, the wetted materials are PEEK (housing) and Silicone (sealing). Please check the compatibility of the fluids used with the valve materials before use.

The inlet and outlet of the valve are located on the bottom side and are equipped with O-rings for sealing. The valve evaluation kit includes fluidic adapters on which the valves can be mounted.

Fig. 784: *memetis* The Bestseller Bundle

Product Code	Description	Detail	Price [€/instrument]
10001412	*memetis* The Bestseller Bundle	Contains: 2 memetis PEEK NC valves for liquids and gases 2 memetis fluidic adapters with Luer fitting(PEEK) 1 memetis programmable electrical control unit	418.00

Product Code	Description	Detail	Price [€/instrument]
10001409	Normally-closed, 2/2-way, monostable miniature valve for liquids and gases (media-separated). Can be sterilized by autoclaving. Housing material: PEEK Membrane material: Silicone	Functionality: Normally closed valve: on/off, proportional control possible Dimensions: 20 x 5 x 8 mm^3 Nominal width: 0.8 mm Internal volume: < 6.5 μl Max. pressure input: 3 bar Max. pressure output: 2 bar Housing material: PEEK Sealing material (inside valve): Silicone Sealing material (outer interface): FKM o-rings Ambient temperature: 10 – 55 °C Lifespan: 30 x 10^6 cycles Fluid connection: Flange mount (2x M1.6 screws), silicone o-rings included Electrical connection: Pins (cable provided) Operating voltage: < 5 V, control Power consumption: ≤ 0.25 W Switching Time: Opening < 0.05 s; Closing < 0.16 s Switching Frequency: Max. 2 Hz Kv value: > 0.005 m^3/h Flow rates @ Δp 1 bar: ~ 3000 ml/min (air), ~90 ml/min (water)	99.00
10001411	Programmable electronic control unit for memetis normally-closed valves. Controls up to two NC valves	Electrical control for manual operation of up to 2 valves Functionality: Push-/ Toggle-Buttons available, Remotely controllable for enhanced automation Supply voltage: 5V Interface: USB, I2C, IO-channels	225.00
10002131	memetis valve adapter	Valve adapter with one inlet and one outlet, made of PEEK, without Luer fittings.	34.00

12.8 Circular Peristaltic Micropumps CCP1 – *Jobst Technologies*

The peristaltic micropumps from *Jobst Technologies* warrant small flow rates for various liquids and gases in diverse microfluidic applications. Their small footprint enables their direct integration in any fluid and gas supply system. Since the pumped media is only in contact with a medical grade silicon tube, the CPP1 peristaltic micropumps enable biocompatible media streams in microfluidic systems.

Benefits and characteristics:

- Stable and reproducible pumping of various fluids and gases
- Only medical grade leak free silicone tubing in contact with the media
- Bidirectional pumping with pump rates from 150 nl/min to 1700 µl/min (depending on pump type)
- Miniaturized form factor enabling the integration into arrays and complex microfluidic devices
- More than 1000 operating hours at 50 µl/min (depending on pump type)
- Separation of the inlet/outlet for pressures >1 bar. Always closed in the switched-off state
- Low-cost solution for precision handling of fluids and gases for microfluidic systems

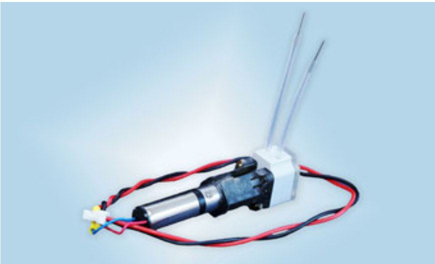


Fig. 785: CCP1 circular peristaltic pump (type MP.CPP1.180.ZM)

Fig. 786: CCP1 circular peristaltic pump (type MP.CPP1.150)

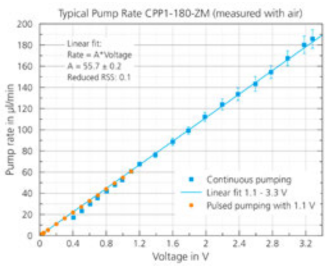


Fig. 787: *Jobst Technologies* exemplarily pump rate using CCP1-180-ZM

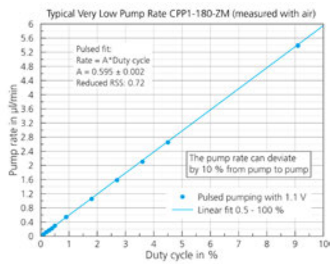


Fig. 788: *Jobst Technologies* exemplarily very low pump rate using CCP1-180-ZM

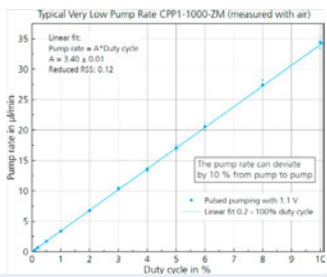


Fig. 789: *Jobst Technologies* exemplarily very low pump rate using CCP1-1000-ZM

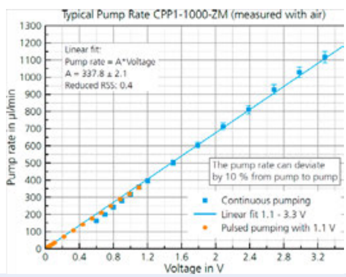


Fig. 790: *Jobst Technologies* exemplarily pump rate using CCP1-1000-ZM

Standard connector options for all CPP1 peristaltic micropumps are JST-SH 2 pole male connectors ready to be plugged into our evaluation kit pump drivers. Other cable lengths and connector options are available upon request.

The pumps are equipped with silicone tubing with 0.5 mm inner diameter and 1.3 mm outer diameter. The tubing is compatible with 1 mm outer diameter PTFE tubing (product code 10000032) making them compatible with Luer or Mini-Luer connectors from *microfluidic ChipShop*, for which convenient interface kits are at hand (e.g. Integrated chip support kit 2, product code 10001670). Optionally, the male-male metal fluidic connectors (product code 10001716) from *Jobst Technologies* can be used to connect the pump to any other flexible tubes.

All connection options are compatible with the maximum pressure of the CPP1 peristaltic micropumps of more than >1 bar.

Disclaimer: Evaluation product for professionals to be used solely for research and development purposes. Not for medical and diagnostic use. Not to be used in humans. For more information contact *IST AG*.

Lifetime considerations

If the flow rate should be below 60 µl/min (which is the case for voltages < 1.1 V at 100 % duty cycle) for longer time, a duty cycle of less than 100 % at fixed 1.1 V must be used. Otherwise, the pump lifetime will be substantially lower.
The longest accumulated lifetime will be reached with intermittent operation. Continuous operation at high-speed leads to a non-linear degradation behavior of the pump tube.

Handling instructions

The pump does contain exposed metal surfaces; therefore, pump operation is only recommended at relative humidity levels below 90 % and temperatures below 50 °C.
Only media that does not swell or chemically attack silicone should be pumped. Particles in the pumped fluid that can penetrate and harm the tube walls can result in leakage.
The electrical connections to the pump are stranded wires and can break when bent extensively or repeatedly.
Do not open the pump. There are no serviceable parts inside the pump. Warranty will be void if the label containing the serial number is damaged.

Single Pump and Pump Drivers

There are two evaluation kits available to control either 2 to 4 pumps simultaneously. They work plug and play (USB powered) with computers running Windows 10 OS. Part of the evaluation kits is a graphical user interface to control up to 4 pumps. Timing, pump speed and direction can be set and saved/loaded as multi-step routines. The GUI as well as the driver are available as Open-Source Code. Additionally, the evaluation kits can be interfaced by command line inputs and therefore can be integrated in any common coding language. Don't hesitate to contact us for further information.

Fig. 791: *Jobst Technologies* EvaKit2 - CCP1 Evaluation Kit for 2 pumps (driver)

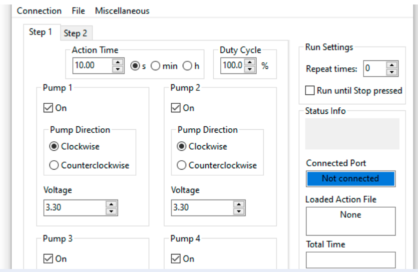


Fig. 792: *Jobst Technologies* graphical user interface

Product Code	Product Name	Description	Dimensions [mm] Lenght / Width / Height	Weight [g]	Price [€]
10001706	MP.CPP1.150	For low pump rates in fluids and gases Flow range 10 - 150 µl/min	9.5 x 11.2 x 34.2	3.3	114.00
10001707	MP.CPP1.800	For high pump rates in fluids and gases Flow range 70 - 800 µl/min	9.5 x 11.2 x 31.7	3.2	114.00
10001708	MP.CPP1.180.ZM	For very low pump rates in fluids and gases Flow range 0.15 - 180 µl/min	9.5 x 11.2 x 43.0	5.6	139.00
10001709	MP.CPP1.1000.ZM	For very high to low pump rates of aqueous fluids and gases Flow range 1 - 1700 µl/min	9.5 x 11.2 x 40.5	5.3	139.00
10001710	EvaKit2	CPP1 Evaluation Kit for 2 pumps	27.0 x 32.0 x 14.0	11	170.00
10001711	EvaKit4	CPP1 Evaluation Kit for 4 pumps	27.0 x 32.0 x 18.0	13	230.00

Microfluidic Accessories

Pyramid-Connector: 4-way connector for flexible fluidics tubes without a predominant direction – 1 inlet stream can equally be split into 3 outlet streams.

Y-connector: 3-way connector for flexible fluidics tubes without a predominant direction – 1 inlet stream can equally be split into 2 outlet streams.

X-connector: 4-way connector for flexible fluidics tubes with a predominant direction.

Holder for CPP1 pumps: Holder for the CPP1 circular peristaltic micropumps. It can be fixated with double sided tape or with two ISO M3 screws with a hole pitch of 20 mm. The holder fits on microscope slides and can be integrated into microscope slide handling frames.

Metal connector for 0.5 mm inner diameter tubing: The silicone tubing of the CPP1 micropumps acts as a female connection for our straight stainless-steel metal connectors. On this male-male connector any other flexible 0.5 mm inner diameter tubes can be connected as well.

All connectors are compatible with flexible tubing with an inner diameter of 0.5 – 0.76 mm.

Fig. 793: Various accessories for peristaltic pumps, i.e. Pyramid-Connector (splitting 1 fluid stream into 3 fluid streams)

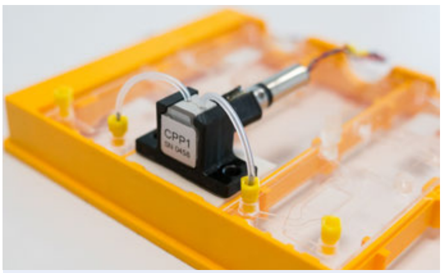


Fig. 794: CCP1 pump mounted on a handling frame via a holder (black) and connected to chips in slide format

Fig. 795: Y-Connector (splitting 1 fluid stream into 2 fluid streams)

Fig. 796: 2 Male-Male adapters (silver) connected to a piece of silicone tubing

Product Code	Description	Price [€]
10001712	Pyramid-connector for connecting 4 tubes with 0.5 mm i.D.	52.00
10001713	Y-connector for connecting 3 tubes with 0.5 mm i.D.	35.00
10001714	X-connector for connecting 4 tubes with 0.5 mm i.D.	46.00
10001715	CPP1 micro pump holder	12.00
10001716	Straight male-male connector. Two-pieces	6.00
10001717	Silicone tube extension 50 cm Two male-male connectors	12.00

Ready-to-Use Pump Kits (without chips)

Our ready-to-use pump kits feature everything you need to have at hand to right away setup your microfluidic pump system. They are available for various flow ranges and feature all necessary items such as several pumps, USB powered pump driver with graphical user interface, pump holders to conveniently mount the pumps on a microscope slide sized chip or handling frame, as well as metal connectors and tubing.

Product Code	Product Name	Description	Price [€]
10001718	**Beginner Kit for 2 Pumps** (very low/low flow rates)	Consisting of: - 2x CCP1 180-ZM pumps - 1x EvaKit2 pump driver for 2 pumps - 2x CPP1 micro pump holder - 1x Two Male-Male connectors with 50 cm silicone tube extension	484.00
10001720	**Beginner Kit for 2 Pumps** (very high/low flow rates)	Consisting of: - 2x CCP1 1000-ZM pumps - 1x EvaKit2 pump driver for 2 pumps - 2x CPP1 micro pump holder - 1x Two Male-Male connectors with 50 cm silicone tube extension	484.00
10001721	**Advanced Kit for 4 Pumps** (very low/low flow rates)	Consisting of: - 4x CCP1 180-ZM pumps - 1x EvaKit4 pump driver for 4 pumps - 4x CPP1 micro pump holder - 2x Two Male-Male connectors with 50 cm silicone tube extension	858.00

13 Microfluidic kits

Microfluidic kits

To run microfluidic experiments some basics like tubes, connectors, or reagents are necessary, or different options of tubes and fluidic interfaces might be of interest. In order to allow for a choice between the options, this chapter has several selections of kits comprising interfaces, chips with instrument, selection of chip types, handling frames or further accessories.

13.1 Microfluidic chip support kits – Microfluidic and chip-PCR support kits

The **microfluidic support kits** comprise different components necessary for running microfluidic systems. This includes tubes to bring the fluid into the chip, and silicone tubes to enable the interconnection between for example a *microfluidic ChipShop* fluidic platform chip and tubing, or between tubing and a syringe. Forceps can be used to stop a flow by clamping a silicone tube and syringes to fill chips manually.

These small kits allow you to directly start with your microfluidic experiments without losing time searching for suitable components.

Comparable to the **microfluidic support kits**, the **chip-PCR support kits** enable you to directly start with your continuous-flow PCR from the fluidic side. They include tubes and mineral oil to drive the PCR. Besides this and the PCR system consisting of chip and thermocycler, only your own biological reagents are needed to start the PCR.

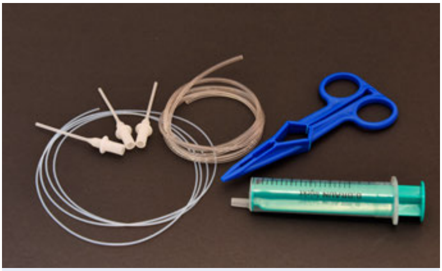


Fig. 797: Microfluidic support kit 1

Fig. 798: Microfluidic support kit 2

Product Code	Kit Type	Product Description		Price [€/kit]
10001632	Microfluidic support kit 1	- Silicone tube (ID: 0.5 mm, OD: 2.5 mm, 1m) - PTFE tube (ID: 0.5 mm, OD: 1 mm, 1m) - Forceps (1) - Single-use syringes (10 ml, 3) - Syringe adapter (3)	10000033 10000032 10000641 10000312 10000614	27.80
10001642	Microfluidic support kit 2	- Silicone tube (ID: 0.5 mm, OD: 2.5 mm, 1m) - Silicone tube (ID: 0.76 mm, OD: 1.65 mm, 1m) - PTFE tube (ID: 0.5 mm, OD: 1 mm, 1m) - Forceps (1) - Single-use syringes (10 ml, 3) - Syringe adapter (3) - Male Mini Luer fluid connectors, red, material: PP (10) - Male Mini Luer fluid connectors, blue, material: PP (10) - Male Mini Luer fluid connectors, opaque, material: TPE (10) - Male Mini Luer plugs, green, material: PP (10) - Male Mini Luer plugs, opaque, material: TPE (10)	10000033 10000031 10000032 10000641 10000312 10000614 10000064 10000096 10000116 10000052 10000054	96.50
10001645	Microfluidic support kit 3	- Microfluidic support kit 2 plus: - Female Luer Lock compatible connectors with wide base, material: PMMA (10) - Male Luer plugs, opaque, material: PP (10) - Adhesive ring (fluidic design 0698) (10)	10001642 10000013 10000230 10000716	160.92
10001646	PCR support kit 1	- Silicone tube (ID: 0.5 mm, OD: 2.5 mm, 1m) - PTFE tube (ID: 0.5 mm, OD: 1 mm, 1m) - Forceps (1) - mcs-oil-04	10000033 10000032 10000641 10001079	32.90

13.2 Microfluidic starter kits

The microfluidic starter kits comprise several standard chips as well as necessary accessories for a quick start with microfluidics. With these kits, a first series of experiments allows to get familiar with the use of microfluidic devices.

Fig. 799: Microfluidic starter kit 1

Fig. 800: Microfluidic starter kit 2

Fig. 801: Bartels mp-Lab! kit

Product Code	Kit Type	Product Description		Price [€/kit]
10001643	Microfluidic starter kit 1	- Microfluidic support kit 1 - Handling frame with high skirt, yellow (1) - Male Mini Luer fluid connectors, red, material: PP (10) - Straight channel chip, 4 channels (200 µm width/ 200 µm depth), material: Topas (2) - Straight channel chip, 4 channels (100 µm width/ 100 µm depth), material: PMMA (2) - Straight channel chip, 16 channels (1000 µm width/200 µm depth), material: Topas (1) - H-shaped channel chip, material: Topas (2) - Droplet generator chip, material: PC (1) - Meander PCR-chip, 36 cycles, material: PC (1) - Meander PCR-Chip, 15 cycles, material: PC (1) - Rhombic chamber chip, 120 µl chamber volume, material: Zeonor (1)	10001632 10000042 10000064 10000091 10001815 10000068 10000266 10000004 10000007 10000008 10000113	369.00
10001644	Microfluidic starter kit 2	- Microfluidic support kit 2 plus - Straight channel chip, 4 channels (200 µm width/ 200 µm depth), material: PMMA (2) - Straight channel chip, 4 channels (200 µm width/ 200 µm depth), material: Topas (2) - Straight channel chip, 16 channels (200 µm width/ 100 µm depth), material: PMMA (2) - Straight channel chip, 16 channels (200 µm width/ 100 µm depth), material: Topas (2) - Rhombic chamber chip, 120 µl chamber volume, material: Zeonor (2)	10001642 10001816 10000091 10000065 10000066 10000113	432.00

Product Code	Kit Type	Product Description		Price [€/kit]
10001648	Microfluidic starter kit 3	- Microfluidic starter kit 1 - Bartels mp-Lab! kit	10001643 10000841	1368.00
10001649	Microfluidic starter kit 4	- Microfluidic starter kit 2 - Bartels mp-Lab! kit	10001644 10000841	1431.00

13.3 Microfluidic interface kits

Various microfluidic interfaces to be used with *microfluidic ChipShop*'s microfluidic platforms are arranged as special kits, e.g. to be used with the female Mini Luer microfluidic platforms, or the female Luer microfluidic platforms.

Fig. 802: Microfluidic interface kit Mini Luer – Mini Luer plugs and connectors

Fig. 803: Microfluidic interface kit Luer – Luer plugs and connectors

Product Code	Kit Type	Product Description		Price [€/kit]
10001651	Microfluidic interface kit - Mini Luer	- Male Mini Luer fluid connectors, green, material: PP (20) - Male Mini Luer fluid connectors, blue, material: PP (20) - Male Mini Luer fluid connectors, opaque, material: TPE (20) - Male Mini Luer plugs, red, material: PP (20) - Male Mini Luer plugs, opaque, material: TPE (20)	10000029 10000096 10000116 10000053 10000054	110.50
10001641	Microfluidic interface kit - Luer	- Male Luer fluid connectors, opaque, material: PP (20) - Male Luer fluid connectors, green, material: PP (20) - Male Luer plugs, opaque, material: PP (20) - Male Luer plugs, black, material: PP (20)	10000080 10000081 10000230 10000231	82.60

13.4 Integrated chip support kits

In order to operate the different integrated chips various fluidic interfaces are necessary or make the handling of the chip more convenient, e.g. Mini Luer or Luer fluid connectors or plugs. Further handling aids like manipulators for turning valves or handling frames are the respective accessories being of use for these devices.

Fig. 804: Integrated chip support kit 1

Fig. 805: Integrated chip support kit 2

Product Code	Kit Type	Product Description		Price [€/kit]
10001652	Integrated chip support 1	- Male Mini Luer fluid connectors, green, material: PP (10) - Male Mini Luer fluid connectors, opaque, material: TPE (10) - Male Mini Luer plugs, red, material: PP (10) - Male Mini Luer plugs, opaque, material: TPE (10) - Male Luer fluid connectors, green, material: PP (10) - Male Luer plugs, opaque, material: PP (10) - Mini Luer to pipette adapter, material: PP (10) - Silicone tube (ID: 0.5 mm, OD: 2.5 mm, 1 m) (2) - PTFE tube (ID: 0.5 mm, OD: 1 mm, 1 m) (5) - Manual turning valve actuator (1) - Handling frame with high skirt, yellow (1)	10000029 10000116 10000053 10000054 10000081 10000230 10000057 10000033 10000032 10000742 10000042	197.14
10001670	Integrated chip support 2	- Male Mini Luer fluid connectors, green, material: PP (10) - Male Mini Luer fluid connectors, opaque, material: TPE (10) - Male Mini Luer plugs, red, material: PP (10) - Male Mini Luer plugs, opaque, material: TPE (10) - Male Luer fluid connectors, green, material: PP (10) - Male Luer plugs, opaque, material: PP (10) - Mini Luer to pipette adapter, material: PP (10) - Silicone tube (ID: 0.5 mm, OD: 2.5 mm, 1 m) (2) - PTFE tube (ID: 0.5 mm, OD: 1 mm, 1 m) (5) - Handling frame with high skirt, yellow (1)	10000029 10000116 10000053 10000054 10000081 10000230 10000057 10000033 10000032 10000042	169.76
10001671	Integrated chip support 3	- Male Mini Luer fluid connectors, green, material: PP (10) - Male Mini Luer fluid connectors, opaque, material: TPE (10) - Male Mini Luer plugs, red, material: PP (10) - Male Mini Luer plugs, opaque, material: TPE (10) - Mini Luer to pipette adapter, material: PP (10) - Silicone tube (ID: 0.5 mm, OD: 2.5 mm, 1 m) (2) - PTFE tube (ID: 0.5 mm, OD: 1 mm, 1 m) (5) - Manual turning valve actuator (1) - Handling frame with high skirt, yellow (1)	10000029 10000116 10000053 10000054 10000057 10000033 10000032 10000742 10000042	159.64

Product Code	Kit Type	Product Description		Price [€/kit]
10001672	Integrated chip support 4	- Male Mini Luer fluid connectors, green, material: PP (10) - Male Mini Luer fluid connectors, opaque, material: TPE (10) - Male Mini Luer plugs, red, material: PP (10) - Male Mini Luer plugs, opaque, material: TPE (10) - Mini Luer to pipette adapter, material: PP (10) - Silicone tube (ID: 0.5 mm, OD: 2.5 mm, 1 m) (2) - PTFE tube (ID: 0.5 mm, OD: 1 mm, 1 m) (5) - Manual turning valve actuator (1)	10000029 10000116 10000053 10000054 10000057 10000033 10000032 10000742	144.64

13.5 Sample preparation starter kits

Sample preparation starter kit 1 – plasma generation comprise plasma generation chips with either 2 or 4 membranes, accessories and a user guide for a quick start in on-chip plasma generation out of whole blood. Depending on the blood sample, the included chips allow generation of plasma/serum in the range of 12 – 15 µl (Chip with 4 membranes) and 20 – 35 µl (Chip with 2 membranes).

Sample preparation starter kit 2 – enrichment comprise a cross-flow membrane chip with 4 membranes, accessories and a user guide for a quick start in on-chip enrichment of bacterial suspensions. Cell suspensions can be filled in tanks. For bigger volumes, accessories for the connection to pumps are included. Cells are filtered by a membrane with determined pore size. The membrane divides the chip in one upper and one lower compartment, which can be opened and closed separately. Once cells are enriched in the upper compartment, they can be exhausted by closing the outlet of the lower compartment and opening the outlet of the upper compartment.

Fig. 806: Sample preparation starter kit 1 – plasma generation

Fig. 807: Sample preparation starter kit 2 – enrichment

Product Code	Kit Type	Product Description		Price [€/kit]
10001659	Sample preparation starter kit 1 - Plasma generation	- Male Mini Luer plugs - Low volume displacement, red, material: PP (40) - Mini Luer to pipette adapter, material: PP (40) - Handling frame with high skirt, yellow (1) - Plasma generation chips with 4 membranes, material: Topas (5) - Plasma generation chips with 2 membranes, material: Topas (5)	10000280 10000057 10000042 10000021 10000439	678.30

Product Code	Kit Type	Product Description		Price [€/kit]
10001660	Sample preparation starter kit 2 - Enrichment	- Row of 4 tanks with cap, material: PP (10) - Male Mini Luer plugs, green, material: PP (40) - Mini Luer to pipette adapter, material PP (40) - Handling frame with high skirt, yellow (1) - Cross-flow membrane chip with 4 membranes, material: Topas (10) - Silicone tube (ID: 0.5 mm, OD: 2.5 mm, 1 m) (1) - Male Mini Luer fluid connector, green, material: PP (20) - Male Luer fluid connector, green, material: PP (10)	10000079 10000052 10000057 10000042 10000022 10000033 10000029 10000081	631.70

13.6 ChipGenie® edition P starter kits

The ChipGenie® edition P starter kits comprise several standard chips that can be used with the ChipGenie® edition P instrument as well as accessories that can be combined with the system.

Depending on users' preferencies, the chips can be either operated manually with a pipette or with a pump that can be connected to the chip with the male Mini Luer fluid connectors.

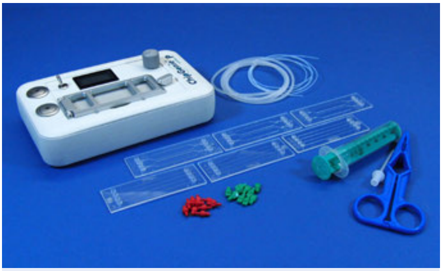


Fig. 808: *ChipGenie® edition P* starter kit 1

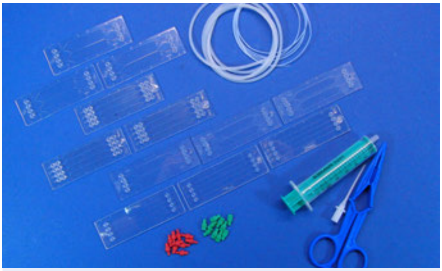


Fig. 809: *ChipGenie® edition P* starter kit 2

Fig. 810: *ChipGenie® edition P* starter kit 3 – DNA extraction from whole blood

Fig. 811: *ChipGenie® edition P* starter kit 5 – DNA extraction from bacterial suspension

Product Code	Kit Type	Product Description		Price [€/kit]
10001655	ChipGenie edition® P starter kit 1	- ChipGenie edition® edition P instrument - Microfluidic support kit 1 - Male Mini Luer fluid connectors, red, material: PP (10) - Male Mini Luer plugs, green, material: PP (10) - Rhombic chamber chip, 120 µl chamber volume, material: Zeonor (3) - Straight channel chip, 4 channels (1000 µm width/ 200 µm depth), material: Topas (3)	10000166 10001632 10000064 10000052 10000113 10000107	1,981.65

Product Code	Kit Type	Product Description		Price [€/kit]
10001657	ChipGenie edition® P starter kit 2	- Microfluidic support kit 1 - Male Mini Luer fluid connectors, red, material: PP (10) - Male Mini Luer plugs, green, material: PP (10) - Rhombic chamber chip, 120 µl chamber volume, material: Zeonor (3) - Rhombic chamber chip, 100 µl chamber volume, material: Zeonor (3) - Rhombic chamber chip, 250 µl chamber volume, material: Zeonor (3) - Straight channel chip, 4 channels (1000 µm width/ 200 µm depth), material: Topas (3)	10001632 10000064 10000052 10000113 10000047 10000049 10000107	384.00
10001673	ChipGenie edition® P starter kit 3 – DNA extraction from whole blood	- Male Mini Luer fluid connectors, green, material: PP (20) - Male Mini Luer plugs, green, material: PP (40) - Mini Luer to pipette adapter, material: PP (20) - Silicone tube (ID: 0.5 mm, OD: 2.5 mm, 1 m) (1) - Rhombic chamber chip, 120 µl chamber volume, material: Zeonor (10) - ChipGenie® edition P starter kit 6 - buffer set for whole blood	10000029 10000052 10000057 10000033 10000113 10001256	from 561.43
10001674	ChipGenie edition® P starter kit 5 - DNA extraction from bacterial suspension	- Male Mini Luer fluid connectors, green, material: PP (20) - Male Mini Luer plugs, green, material: PP (40) - Mini Luer to pipette adapter, material: PP (20) - Rhombic chamber chip, 120 µl chamber volume, material: Zeonor (10) - Silicone tube (ID: 0.5 mm, OD: 2.5 mm, 1 m) (1) - ChipGenie® edition P starter kit 7 - buffer set for bacterial suspension	10000029 10000052 10000057 10000113 10000033 10000420	from 561.43

13.7 Molecular biological starter kits

microfluidic ChipShop´s microfluidic toolbox offers the complete set of chip modules and accessories to start directly with molecular biological experiments. Tubes, accessories for the interconnection and liquid handling are included. The molecular biological starter kits and the microfluidic accessories are designed for the combination with handling frames and chips of the molecular biological product families.

PCR starter kit – continuous flow PCR comprise chips with different number of PCR cycles and materials including accessories and application notes for a quick start in continuous flow PCR.

PCR starter kit – oscillating PCR comprise Boyle-Mariotte PCR chips and materials including accessories and application notes for a quick start in oscillation PCR.

PCR starter kit – stationary PCR comprise PCR reaction chamber chips of 10, 20 and 24 µl volume including PCR master mix and accessories for a quick start in on-chip stationary PCR.

PCR starter kit – stationary qPCR comprise qPCR reaction chamber chips of 10 and 20 µl volume including qPCR master mix and accessories for a quick start on stationary qPCR. Air bubble traps inside the chips enabling a clear imaging area for optical readout.


Fig. 812: PCR starter kit 1 - continuous flow PCR


Fig. 813: PCR starter kit 2 - oscillation PCR

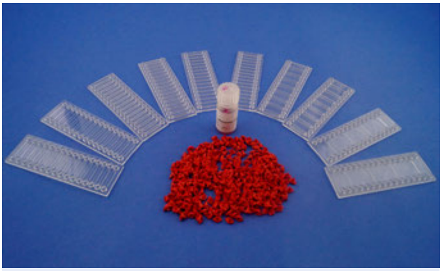


Fig. 814: PCR starter kit 3 - stationary PCR

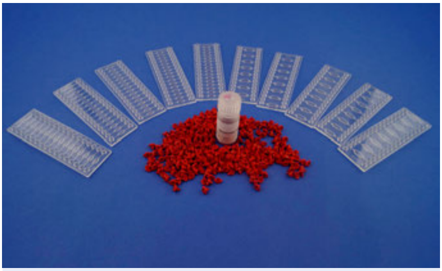


Fig. 815: PCR starter kit 4 - stationary qPCR

Product Code	Kit Type	Product Description		Price [€/kit]
10001675	PCR starter kit - continuous flow PCR	- Silicone tube (ID: 0.5 mm, OD: 2.5 mm, 1 m) - PTFE tube (ID: 0.5 mm, OD: 1 mm, 1 m) - Forceps (1) - mcs-oil 04 - continuous-flow PCR-chip, 15 cycles, material: PC (2) - continuous-flow PCR-chip, 36 cycles, material: PC (2) - continuous-flow PCR-chip, 41 cycles, material: PC (2) - continuous-flow PCR-chip, 40 cycles, material: PC (2) - continuous-flow PCR-chip, 40 cycles, material: Zeonor (2) - Manual	10000033 10000032 10000641 10001079 10000008 10000007 10000745 10000010 10000011	313.28
10001676	PCR starter kit - oscillation PCR	- Silicone tube (ID: 0.5 mm, OD: 2.5 mm, 1 m) - PTFE tube (ID: 0.5 mm, OD: 1 mm, 1 m) - Forceps (1) - Boyle-Mariotte PCR chip, material: PC (10) - Male Luer fluid connector, green, material: PP (10) - Manual	10000033 10000032 10000641 10000639 10000081	320.40
10001678	PCR starter kit - stationary PCR	- Male Mini Luer plugs - Low volume displacement, red, material: PP (20) - Rhombic chamber chip, 10 μl chamber volume, material: Zeonor (2) - Rhombic chamber chip, 10 μl chamber volume, material: Zeonor (2) - Rhombic chamber chip, 24 μl chamber volume, material: Zeonor (2) - Rhombic chamber chip, 20 μl chamber volume, material: Zeonor (2) - Rhombic chamber chip, 20 μl chamber volume, material: Zeonor (2) - Manual	10000280 10000537 10000543 10000354 10000561 10000567	274.18

Product Code	Kit Type	Product Description		Price [€/kit]
10001679	PCR starter kit - stationary qPCR	- Male Mini Luer plugs - Low volume displacement, material: PP (20) - Rhombic chamber chip with bubble traps, 10 µl chamber volume, material: Zeonor (5) - Rhombic chamber chip with bubble traps, chamber volume: 20 µl, material: Zeonor (5) - Manual	10000280 10000447 10000556	402.84

13.8 ChipGenie® edition E2 kits

The ChipGenie® edition E starter kits comprise instrument and standard chips as well as standards to carry out capillary electrophoresis with contactless conductivity detection on chip.

Fig. 816: ChipGenie® edition E2 – starter kit 1

Fig. 817: ChipGenie® edition E2 – starter kit 2

Product Code	Description	Detail	Product Code	Price [€]
10001694	ChipGenie® edition E2 starter kit 1	- ChipGenie® edition E2 instrument - Cross-shaped channel chips (50 µm width/50 µm depth), T-junction, material: PMMA (2) - Cross-shaped channel chips (50 µm width/50 µm depth), double T-junction, material: PMMA (2) - Cross-shaped channel chips (100 µm width/100 µm depth), T-junction, material: PMMA (2) - Cross-shaped channel chips (100 µm width/100 µm depth), T-junction, material: Zeonor (2) - Single-use syringes, 1 ml (10) - 10 ml mcs buffer 03 (separation buffer) - ChipGenie® edition E starter kit 3 – standards: Cation standard solution, Li^+, Na^+, K^+ (1 ml) Anion standard solution, Cl^-; NO_3^-, SO_4^{2-} (1 ml) Organic acid standard solution, tartaric acid, succinic acid, citric acid (1 ml)	10001316 10001805 10001804 10001921 10000338 10000719 10000987 10000516	6,146.25
10001695	ChipGenie® edition E2 starter kit 2	- Cross-shaped channel chips (50 µm width/50 µm depth), T-junction, material: PMMA (2) - Cross-shaped channel chips (50 µm width/50 µm depth), double T-junction, material: PMMA (2) - Cross-shaped channel chips (100 µm width/100 µm depth), T-junction, material: PMMA (2) - Cross-shaped channel chips (100 µm width/100 µm depth), T-junction, material: Zeonor (2) - Single-use syringes, 1 ml (10) - 10 ml mcs buffer 03 (separation buffer) - ChipGenie® edition E2 starter kit 3 – standards: Cation standard solution, Li^+, Na^+, K^+ (1 ml) Anion standard solution, Cl^-; NO_3^-, SO_4^{2-} (1 ml) Organic acid standard solution, tartaric acid, succinic acid, citric acid (1 ml)	10001805 10001804 10001921 10000338 10000719 10000987 10000516	790.00
10000516	ChipGenie® edition E2 kit 3 – standards	- Cation standard solution, Li^+, Na^+, K^+ (1 ml) - Anion standard solution, Cl^-; NO_3^-, SO_4^{2-} (1 ml) - Organic acid standard solution, tartaric acid, succinic acid, citric acid (1 ml)		78.20

13.9 Cell Culture Kits

microfluidic ChipShop´s microfluidic toolbox offers the complete set of chip modules and accessories to start directly with cell-based microfluidic experiments. Tubes, accessories for the interconnection and liquid handling are all included. The kits are laid out to gain first experience in simple (beginners kit) or complex (advanced kit) adherend cell culture.

Cell culture kit - Beginners

Chips with hydrophilized surfaces and accessories for an immediate start of simple adherent cell culture. The chips are suitable for applications like immunofluorescence microscopy, screening, apoptosis- and proliferation assays.

Cell culture kit - Advanced

Chips with hydrophilized surfaces and accessories for an immediate start of complex adherent cell cultures. Like for the beginners kit the application include immunofluorescence microscopy and screening. However, the more complex chip designs enable more sophisticated culture setups, including co-culture of various cell types.

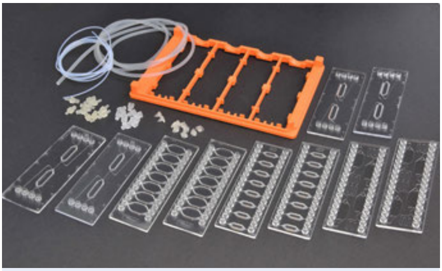


Fig. 818: Cell culture kit - Beginners

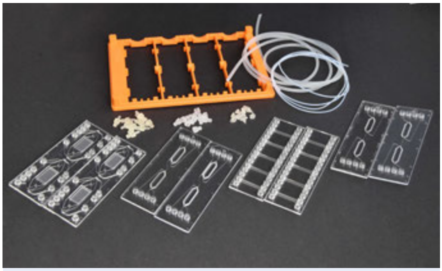


Fig. 819: Cell culture kit - Advanced

Product Code	Kit Type	Product Description	Product Code	Price [€/kit]
10001696	Cell culture kit - Beginners	- Male Mini Luer plugs - Low volume displacement (2x) - Male Mini Luer fluid connectors, single, opaque (2x) - Mini Luer to pipette adapter, opaque, PP (2x) - Silicone tube (ID.: 0.76 mm, OD: 1.65 mm), 1m - PTFE tube, 1 m (3x) - Handling frame with reduced skirt height (1x) - Reaction chamber chip Fluidic 842, Zeonor, hydroph. (2x) - Reaction chamber chip Fluidic 584, Zeonor, hydroph. (2x) - Cell culture chip w/ pre-heating channel Fluidic 992, Zeonor, hydrophilized (2x) - Chamber interaction chip Fluidic 737, PS, hydrophilized (1x) - Chamber interaction chip Fluidic 688, PS, hydrophilized (1x)	10000205 10000116 10000855 10000031 10000032 10000041 10001036 10000559 10001344 10001062 10001058	438.84
10001697	Cell culture kit - Advanced	- Male Mini Luer plugs - Low volume displacement (2x) - Male Mini Luer fluid connectors, single, opaque (2x) - Mini Luer to pipette adapter, opaque, PP (2x) - Silicone tube (ID.: 0.76 mm, OD: 1.65 mm), 1m - PTFE tube, 1 m (3x) - Handling frame with reduced skirt height (1x) - Chamber interaction chip Fluidic 737, PS, hydrophilized (2x) - Chamber interaction chip Fluidic 688, PS, hydrophilized (2x) - Cross-flow membrane chip Fluidic 653, PS, hydrophilized (2x) - Channel interaction chip Fluidic 983, PS, hydrophilized (2x)	10000205 10000116 10000855 10000031 10000032 10000041 10001062 10001058 10000918 10001348	529.38

Cell culture - Starter kit with micropumps

This cell culturing kit includes all components needed to set up a microfluidic system for cell handling. It provides you with the necessary microfluidic components, electronics and software. That way, you only need to add your cells and feeding medium to get started with your cell culturing experiment.

As cells are living systems, usually belonging more complex systems (i.e. organs), it is crucial that cultivation mimics the physiological environment as close as possible. Within the body, cells are constantly provided with feeding medium (i.e. blood). A microfluidic approach with constant fluidic flow is hence optimal for cell culturing. Microfluidic approaches furthermore ebables high throughput applications:

- The system requires minimal space and energy.
- The whole process is efficient and allows for minimal use and wastage of reagents.

This kit gives the opportunity to perfuse microfluidic bioreactors, in which cells are cultured at stable and very low flow rates (down to 5 μl/min). It is possible to dose in one direction exchanging the whole feeding medium or in a closed-loop utilizing the same medium all over the culturing process. The second option is beneficial for some cells with specific requirements, such as stem cells, which would die if the feeding medium would be exchanged completely.

Adherent cells work particularly well in these microfluidic bioreactors, as this cell type remains within the chamber (self-organized). The pumping principle and flow sensor measurement do not affect cell performance. Furthermore, the microfluidic chip, serving as a micro-bioreactor due to its geometric properties, enables high-throughput applications. This facilitates scalability and parallelization. Since the cell culturing setup is a closed system, humidity control within an incubator is unnecessary, and evaporation plays a minor role. Therefore, basic incubators that solely regulate temperature can be used.

Fig. 820: Cell culture - starter kit with micropumps

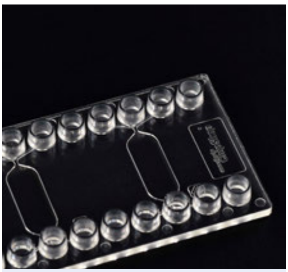


Fig. 821: Rhombic chamber chip Fluidic 131

Fig. 822: mp2 micropump from Bartels

Product Code	Kit Name	Product Description	Amount	Product Code	Mate-rial	Price [€/kit]
10002132	Cell culture-	- mp6 micropumps	3 pcs		-	2,499.00
	Starter kit	- mp-Lowdriver	1 pc		-	
	with micro	- Regulation Software Package	1 pc		-	
	pumps	- mp-Multiboard2	1 pc		-	
		- mp-damper	1 pc		-	
		- mp-s Tubing	1 m		-	
		- flow sensor SLF3s-0600	1 pc		-	
		- Male Mini Luer fluid connectors	1 x 10 pcs	10000116	TPE	
		- Male Mini Luer Plugs	1 x 10 pcs	10000054	TPE	
		- Fluidic 131 rhombic chamber chip	1 pc	10000298	Topas	

13.10 Droplet generation kits

One of the fields in which microfluidics has generated innovative solutions is droplet-based microfluidics. Having the ability to generate a large number of droplets of very uniform size has led researchers to many new applications. By compartmentalizing a biological sample, e.g. droplet-based or so-called digital PCR became possible. Other applications comprise the generation of extremely well-defined emulsions, the synthesis of nanoparticles or the encapsulation of single cells. As the droplet volume can be very small, concentrations e.g. of cell metabolites quickly become very high and can be easily analyzed. Droplet motion in the microchannel induces streaming which allows for a rapid mixing of reagents contained in the droplets. As the droplet content is never in contact with the microchannel walls, no contamination or carryover from one droplet to another occurs.

A family of droplet generator chips in various designs allows for the generation of droplets in different sizes and frequencies. Integrated chips going beyond the droplet generation function, e.g. with combining droplet generation with droplet storage for an afterwards separate optical analysis, over a wide variety of experiments.

The chips can be operated in both pumping and suction modes. As fluidic interfaces female Mini Luer and female Luer adapters are integrated. The female Luer adapter, due to their large volume, not only allows to serve as fluidic interface, but also as liquid reservoir. Standard oils that neither harm standard biological reactions nor the microfluidic chip materials are available at *microfluidic ChipShop*.

Droplet generation - Size variation kits with reagents

These droplet generation kits are the perfect way to start your droplet-based experiment. The droplet variation kits contain everything needed to generate W/O droplets of multiple sizes and in various settings. The kits will help you to determine your optimal experimental layout, without the need for extensive background research. The provided items are perfectly suited to be used with a Fluigent pump setup or a high-end syringe pump, both available with *microfluidic ChipShop*.

Fig. 823: Droplet variation kit articel number 10001653

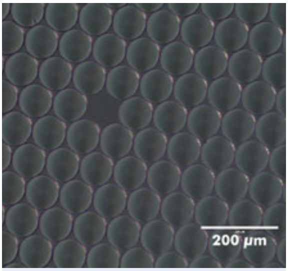


Fig. 824: On-chip generated droplets visualized on a microscope glass slide

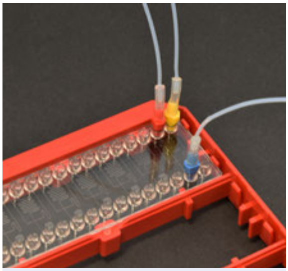


Fig. 825: Mini Luer connectors on Fluidic 440

Product Code	Kit Name	Product Description	Amount	Product Code	Mate-rial	Price [€/kit]
10001653	Droplet generation - Droplet variation kit	- Fluidic 440 Droplet generator	2 pcs	10000174	PC	501.50
		- Fluidic 285 Droplet generator	2 pcs	10000176	PC	
		- Droplet Oil (2% surfactant in fluorinated oil)	3 x 4 ml	10001548	-	
		- Transport & Storage Box, small	1 pc	10001188	-	
		- Handling frame with reduced skirt height	1 pc	10000041	-	
		- Male Mini Luer fluid connectors	4 x 10 pcs	10000116	TPE	
		- Male Mini Luer Plugs	1 x 10 pcs	10000054	TPE	
		- Silicone tube (ID.: 0.76 mm, OD: 1.65 mm)	1 m	10000031	Silicone	
		- PTFE tube	2 x 1 m	10000032	PTFE	

The cooperation of *microfluidic ChipShop* and *emulseo* enables, to widen our off-the-shelf portfolio and include matching high-performance fluorinated oil and surfactant to complete your microfluidic setup.
A family of droplet generator chips in various designs allows the generation of droplets in different sizes and frequencies, with integrated droplet storage function, enabling a wide variety of eperiments.
Our **Ready-to-Use Kit** and **First-User Kit** offer different droplet generators and already include fluorinated oil with surfactant and accessories to get right to work with your first droplet application.

Fig. 826: Droplet generation kit - Mini Luer kit

emulseo surfactant: FluoSurf™

Product Code	Kita Name	Product Description	Amount	Material	Product Code	Price [€]
10002033	Droplet generation - Ready-to-use-kit	- Fluidic 440 50 - 80 µm nozzles	1	PC	10000174	785.25
			1	Topas	10000040	
		- Fluidic 947 10 - 30 µm nozzles	1	Topas	10001336	
		- Fluidic 1032 Double cross; 100 µm nozzles	1	PC	10001335	
		- Fluidic 162 Double cross; 70 µm nozzles	1	PC	10000003	
		- Fluidic 912 Single cross; 80 µm nozzle	1	PC	10001333	
			1	Topas	10001985	
		- Fluidic 163 Double cross; 140 µm nozzle	1	PC	10000004	
		- Fluidic 488 Double cross; 74 µm, storage	1	PC	10000511	
		- Fluidic 1147 Single cross; 70 µm; 80 µm	1	PC	10001777	
		- Droplet oil: Fluo-Oil™ 7500	1 x 21 mL	-	10002034	
		- Surfactant: FluoSurf™	1 x 0.5 g	-	10002035	
		- Male Mini Luer fluid connectors	2 x 10 pcs	TPE	10000116	
		- Male Mini Luer plugs	2 x 10 pcs	TPE	10000054	
		- Silicone tube, ID: 0.76 mm, OD: 1.65 mm	1 x 1 m	Silicone	10000031	
		- Micro tubes, PTFE, ID: 0.5 mm, OD:1.0 mm	2 x 1 m	PTFE	10000032	
10002037	Droplet generation - First-user-kit	- Fluidic 440 50 - 80 µm nozzles	1	PC	10001972	230.49
		- Fluidic 947 10 - 30 µm nozzles	1	Topas	10001336	
		- Fluidic 488 74 µm nozzle	1	PC	10000511	
		- Droplet oil: 2% FluoSurf™ in Fluo-Oil™ 7500	4 mL	-	10002036	
		- Male Mini Luer fluid connectors	1 x 10 pcs	TPE	10000116	
		- Male Mini Luer plugs	1 x 10 pcs	TPE	10000054	
		- Silicone tube, ID: 0.76 mm, OD: 1.65 mm	1 x 1 m	Silicone	10000031	
		- Micro tubes, PTFE, ID: 0.5 mm, OD:1.0 mm	1 x 1 m	PTFE	10000032	

Droplet generation - Material compatibility kit

These droplet kits contain a variety of *microfluidic ChipShop*'s basic designs for droplet generation as well as matching accessories to connect the chips to a pump system of choice. They come with varying interface types (Luer or Mini Luer) and in two different materials, namely PC and Topas. Though both materials are ideally suited for the task of droplet generation, they feature different chemical resistances.

Please note: When utilizing silicone-based oils we recommend the use of Topas chips, while mineral oils require chips made from PC.

Fig. 827: Droplet generation kit - Mini Luer kit

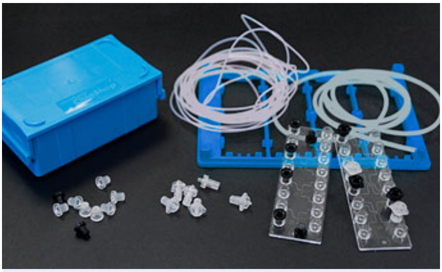


Fig. 828: Droplet generation kit - Luer kit

Product Code	Kit Name	Product Description	Product Code	Price [€/ kit]
10001661	Droplet generation kit - Mini Luer kit Topas	- Fluidic 162 (2) - Fluidic 163 (2) - Fluidic 285 (1) - Transport & Storage Box Fluidic 832 (1) - Low Skirt Handling Frame (1) - Mini Luer Fluid Connectors Fluidic 331 (10) - Mini Luer Plugs Fluidic 334 (10) - Silicone Tubing (1 m) - PTFE Tubing (1 m)	10000005 10000006 10000175 10001188 10000041 10000096 10000052 10000031 10000032	277.50
10001658	Droplet generation kit - Mini Luer kit PC	- Fluidic 162 (2) - Fluidic 163 (2) - Fluidic 285 (1) - Transport & Storage Box Fluidic 832 (1) - Low Skirt Handling Frame (1) - Mini Luer Fluid Connectors Fluidic 331 (10) - Mini Luer Plugs Fluidic 334 (10) - Silicone Tubing (1 m) - PTFE Tubing (1 m)	10000003 10000004 10000176 10001188 10000041 10000096 10000052 10000031 10000032	277.50
10001698	Droplet generation kit - Luer kit Topas	- Fluidic 536 – Four Elements on one chip (2) - Fluidic 537 – Double emulsion (droplet in droplet) (2) - Transport & Storage Box Fluidic 832 (1) - Low Skirt Handling Frame (1) - Luer Fluid Connectors Fluidic 263 (10) - Luer Plugs Fluidic 270 (10) - Silicone Tubing (1 m) - PTFE Tubing (1 m)	10000433 10000466 10001188 10000041 10000081 10000230 10000031 10000032	248.50
10001699	Droplet generation kit - Luer kit PC	- Fluidic 536 – Four Elements on one chip (2) - Fluidic 537 – Double emulsion (droplet in droplet) (2) - Transport & Storage Box Fluidic 832 (1) - Low Skirt Handling Frame (1) - Luer Fluid Connectors Fluidic 263 (10) - Luer Plugs Fluidic 270 (10) - Silicone Tubing (1 m) - PTFE Tubing (1 m)	10000509 10000467 10001188 10000041 10000081 10000230 10000031 10000032	248.50

Droplet generation - Starter kit with micropumps

This Droplet generation kit contains all essentials for initial microfluidic droplet trials. Acquiring a high-end pump system usually demands a significant five-digit investment, a notable entry barrier for droplet generation. Our kit overcomes this by offering an unbeatable price, providing all hardware components necessary for generating various sizes of W/O droplets in diverse settings. It seamlessly connects to a computer and microscope for visualization.

Built upon Bartels mp-Multiboard2 evaluation board's modular capabilities, the kit includes the board, two driver chips, and mp6 micropumps. Reservoirs, tubing, and connectors for system setup are included. Enhancing droplet generation, it incorporates a Sensirion flow sensor and Bartels flow damper. The microfluidic chips, provided by *microfluidic ChipShop*, feature two designs, enabling droplet generation in distinct sizes and frequencies.
For an immediate start, we suggest including our high-performance droplet generation oil (article number 10001548) to your order.

Please note: Droplet generation frequency might be lower compared to pressure- or syringe-based systems.

Fig. 829: Droplet generation - starter kit with micropumps

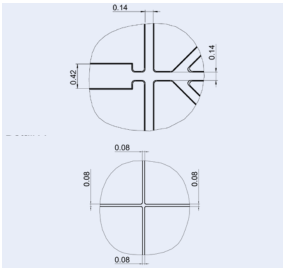
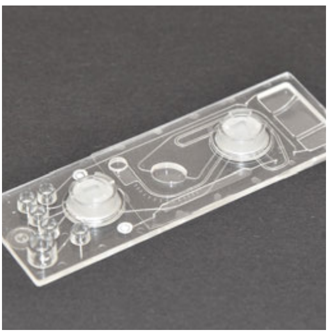
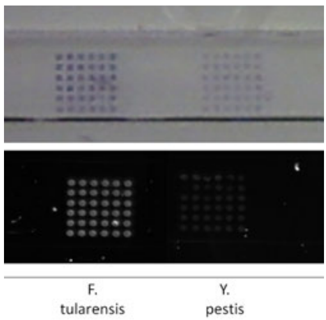


Fig. 830: Droplet generation cross of chip Fl. 163 (top) and Fl. 912 (bottom)

Fig. 831: mp2 micropump from Bartels

Product Code	Kit Name	Product Description	Amount	Product Code	Material	Price [€/ kit]
10002133	Droplet generation - Starter kit with micro pumps	- mp6 micropumps	6 pcs		-	1,999.00
		- mp-Highdriver4	1 pc		-	
		- mp-Driver	1 pc		-	
		- mp-Multiboard2 including cable	1 pc		-	
		- Reservoir Bundle	2 pcs		-	
		- mp-s	1 pc		-	
		- mp-y	1 pc		-	
		- mp-damper	1 pc		-	
		- flow sensor SLF3s-0600	1 pc		-	
		- Male Mini Luer fluid connectors	1 x 10 pcs	10000116	TPE	
		- Male Mini Luer Plugs	1 x 10 pcs	10000054	TPE	
		- Fluidic 163 Droplet generator	1 pc			
		- Fluidic 912 Droplet generator	1 pc			




F.
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14 Application development: Assay & reagent implementation

Application development: Assay & reagent implementation

The transfer of biological and chemical assays on chip as well as reagent implementation and surface modification are central elements for the development of lab-on-a-chip systems. We offer our customers these application related services in order to facilitate the overall product development. Our equipped laboratories can be commonly used for development and quality control purposes.

14 Application development: Assay & reagent implementation

Lab-on-a-chip systems target to make biological and diagnostic assays simpler, more sensitive, less error prone and to combine several assay steps conventionally done in different systems in one device.

To cope with the complex task to develop such systems, standard assay steps need to be adapted to the special requirements of the microfluidic surrounding as well as topics like surface functionalization or dry and liquid reagent storage have to be addressed.

Independent how different the custom specific assays themselves are, the underlying principle and general steps to transfer the assay on chip have similar requirements and are part of microfluidic ChipShop's daily business.

Facilitating assay and product development for our customers, microfluidic ChipShop offers the following special services including the validation of the respective processes together with the customer:

- Reagent implementation
  - Dry reagent storage
    - Examples
      - PCR master mixes
      - PCR primers and probes
      - Cell lysis reagents
      - Beads for DNA extraction
      - Buffer
  - Liquid reagent storage
    - Storage in blister packs
    - Storage in tanks or syringes

- Spotting
  - DNA arrays
  - RNA arrays
  - Protein arrays

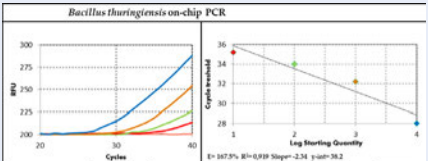
- Assay transfer on chip

- Transfer of instrument platforms to custom products together with the microfluidic device and the respective application.

To cope with these tasks, equipped biological and chemical laboratories and experienced application teams are at hand.

Fig. 832: Implementation of low-volume real-time PCR on chip – Chip on breadboard instrument

Bacillus thuringiensis on-chip PCR



initial DNA- conc.	on chip	initial DNA- conc.	on chip	initial DNA- conc.	on chip
10^0 GE/PCR	N/A	10^2 GE/PCR	34.00	10^4 GE/PCR	28.00
10^1 GE/PCR	35.20	10^3 GE/PCR	32.20	NTC	N/A

Fig. 833: Implementation of low-volume real-time PCR on chip – Real-time PCR curve of *Bacillus thuringensis* PCR

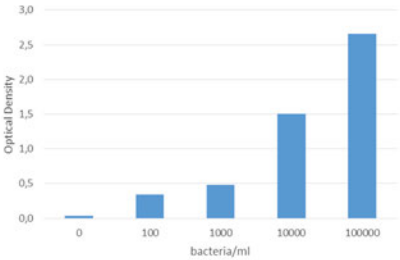


Fig. 834: Immunoassay on chip: results from colorimetric detection of *Francisella tularensis*

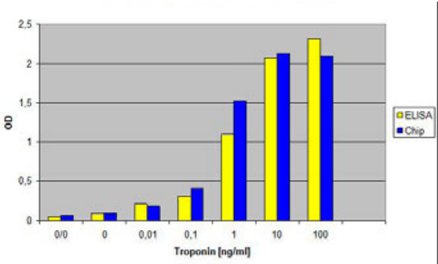
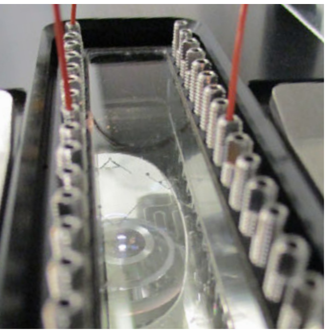
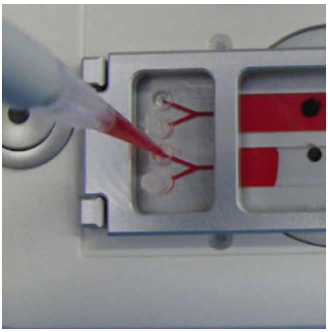


Fig. 835: Implementation of frit-based immunoassay on chip – Target: Troponin, comparison of standard ELISA plate versus assay on chip, colorimetric detection: poly HRP (pHRP)/TMB (blue dye)

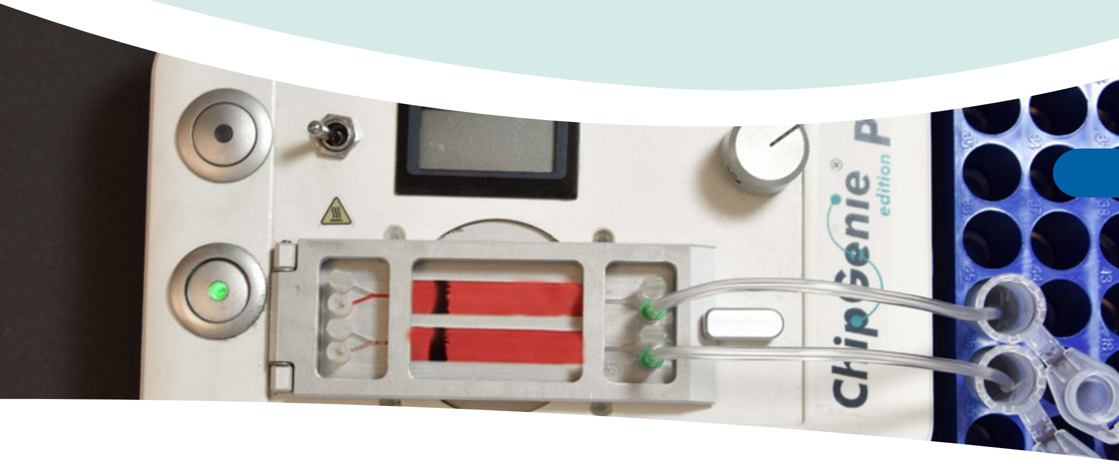
Fig. 836: Implementation of frit-based immunoassay on chip – Target: Troponin, colorimetric detection: poly HRP (pHRP)/TMB (blue dye)






55.0

15 Application notes



Application notes

Handling procedures, protocols, and exemplary applications: This chapter gives advice to run specific experiments with lab-on-a-chip systems.

15.1 Chips interfaces and handling – first steps

This chapter describes first basic steps to start with microfluidic standard chips. It introduces the different fluidic interfaces on chip and their counterpart off chip, tubes to be used and the connection to pumps.

Fluidic interfaces on chip

Referring to standard equipment and nomenclature deriving from laboratory automation and routine laboratory use, a short glossary for the various microfluidic accessories being applied is convenient for a common use of microfluidics. This refers mainly to the fluidic interfaces using the Luer and Luer lock adapters in female and male version as plugs or fluid connectors commonly spread in medical technology, the shrunk versions thereof specially designed for microfluidics called Mini Luer fluid connectors and Mini Luer plugs, olives embedded on chip as well as simple through holes. Examples of these fluid connectors are shown in the figures below.

In all chapters explaining the use of the different interfaces, a choice of accessories being suited to carry out the experiments is summarized in order to start right away with the practical work.

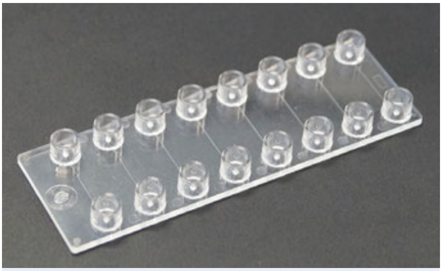


Fig. 837: Chip with female Luer fluidic interfaces

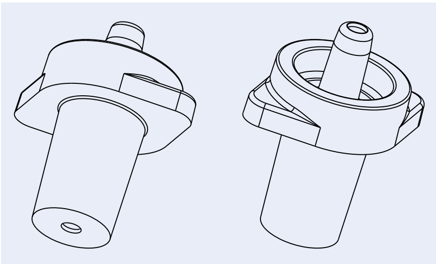


Fig. 838: Male Luer connector

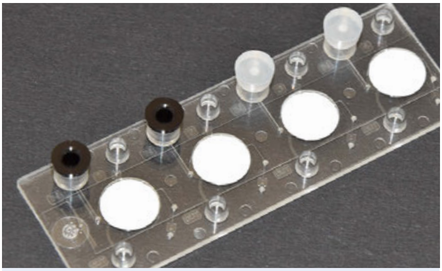


Fig. 839: Cap to close female Luer interfaces

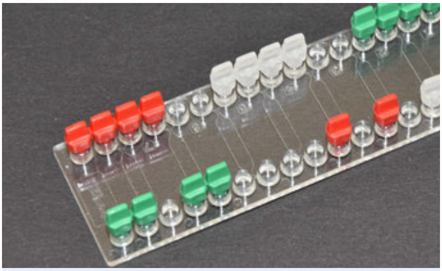


Fig. 840: Mini Luer plugs mounted on a Mini Luer fluidic platform

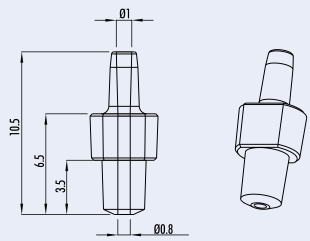


Fig. 841: Schematic drawing of a Mini Luer connector

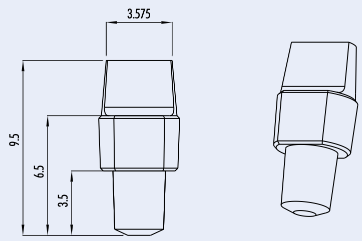


Fig. 842: Schematic drawing of a Mini Luer Plug

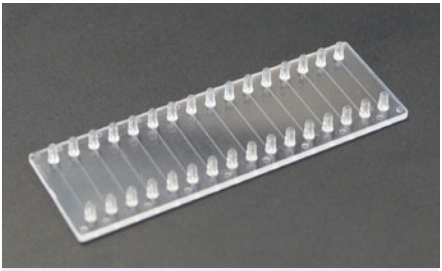


Fig. 843: Microfluidic platform with olives as fluidic interface

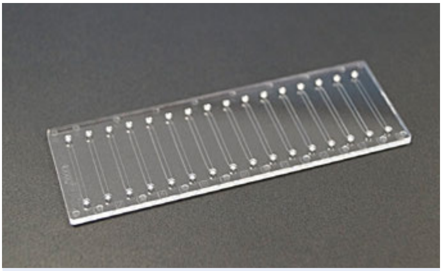


Fig. 844: Microfluidic platform with through holes as fluidic interface

15.1.1 How to work with Mini Luer interfaces

This chapter introduces how to work with Mini Luer interfaces and how to operate chips with such interfaces.

Hints to work with female Mini Luer interfaces on chip:

Option 1: Female Mini Luer interface as pipetting interface or reservoir

The most simple option how to use chips with female Mini Luer interface is to insert the liquid with a pipette or to use the female Mini Luer interfaces as reservoirs.
For beginners is might be easier to use the specially designed Pipette to Mini Luer adapters (10000057)

Required item:

1. Microfluidic chip with Mini Luer interface
2. Conventional pipette
3. Optional Mini Luer to pipette adapters (10000057)

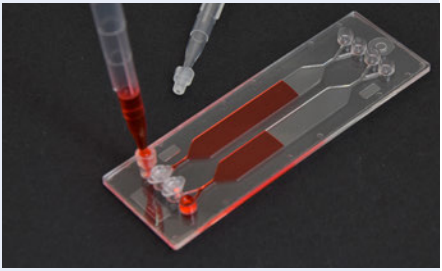


Fig. 845: Microfluidic chip with Mini Luer interfaces filled with a pipette and interfaces used as reservoir

Hints to work with female Mini Luer interfaces on chip:

Option 2: Female Mini Luer interface combined with male Mini Luer counterpart

Required item:
1. Microfluidic chip with Mini Luer interface, e.g. micro mixer chip (10000020)
2. Handling frame, e.g. orange (10000043)
3. Male Mini Luer fluid connectors, e.g. the green version (10000029)
4. Male Mini Luer plugs, e.g. the red version (10000053)
5. Silicone tube, e.g. ID: 0.5 mm (10000033)
6. PTFE tube, e.g. ID: 0.5 mm (10000032)
7. Peristaltic pump
8. Tube for peristaltic pump
9. Eppendorf vessel

Fig. 846: Microfluidic chip with Mini Luer interfaces with Mini Luer fluid connectors and plugs

Step 1: Chip & handling frame

1. Insert the microfluidic chip in a handling frame for microfluidic chips in microscopy slide format

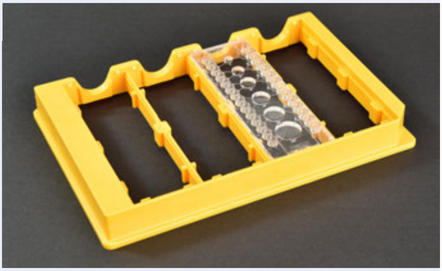


Fig. 847: Micromixer inserted in handling frame

Step 2: Mini Luer connector & silicone sleeve

2. Interface the Mini Luer fluid connector with a small piece of silicone tube

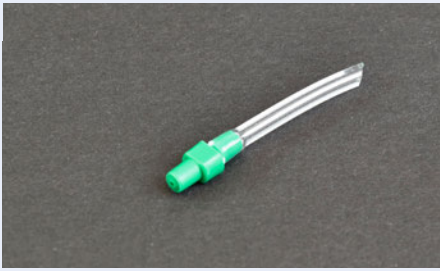


Fig. 848: Green Mini Luer fluid connector attached to silicone sleeve

Step 3: Silicone sleeve & PTFE tube

3. Interface the Mini Luer fluid connector with the mounted silicone sleeve with the PTFE tube

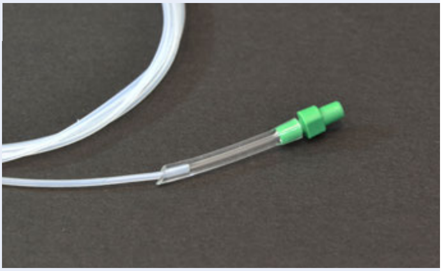


Fig. 849: Connection of Mini Luer fluid connector with mounted silicone sleeve with a PTFE tube

Step 4: Insert connector on chip

4. Insert the Mini Luer fluid connector connected with silicone sleeve and PTFE tubing with a twist on the female interface on chip

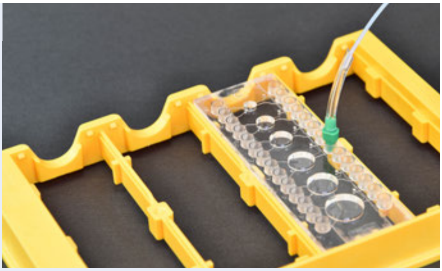


Fig. 850: Insertion of the Mini Luer with tubings in fluid entrance of the chip

Step 5: Insert connector on exit & connect to collection vessel

5. Insert a second Mini Luer fluid connector connected with silicone sleeve and PTFE tubing with a twist on the female interface on chip and place the end of the PTFE tube in an Eppendorf vessel for sample or waste collection

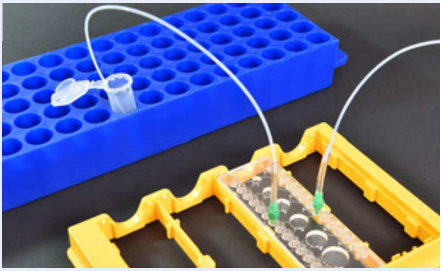


Fig. 851: Insertion of the Mini Luer with tubings in fluid exit of the chip and connection of tube with sampling vessel

Step 6: Close unused ports with plugs

6. Close all unused fluid entrance and fluid exit ports of the fluidic pathway used on chip with Mini Luer plugs.

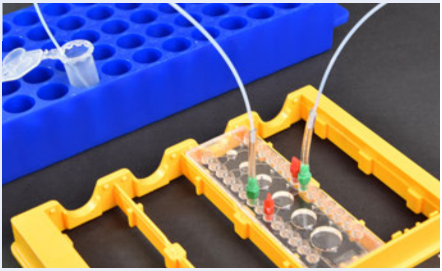


Fig. 852: Closed unused fluid ports on chip with red Mini Luer plugs

Step 7: Connect chip with pump

7. Connect the PTFE tube with the tube inserted in the pump

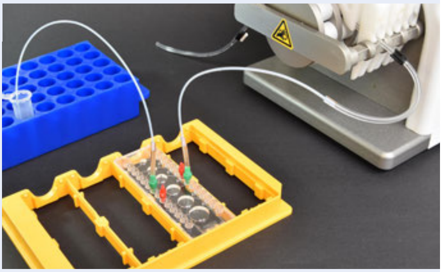


Fig. 853: Connection of the chip via the PTFE tube with the pump

Step 8: Connect pump with reservoir and start pumping

8. Connect the end of the pump tube with a further PTFE tube, insert the PTFE tube in your reagent vessel and start pumping.

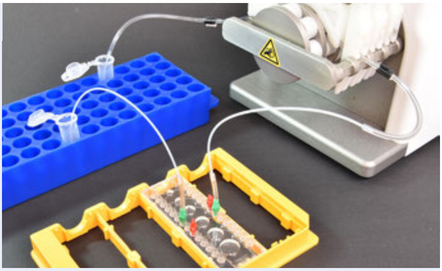


Fig. 854: Connection of pump via a PTFE tube with a liquid reservoir

15.1.2 How to work with Luer interfaces

This chapter summarizes the different options to work with Luer interfaces on chip and how to operate chips with such interfaces.

Hints to work with female Luer interfaces on chip:

Option 1: Female Luer interface as pipetting interface or reservoir

The most simple option how to use chips with female Luer interface is to insert the liquid with a standard syring.

Required item:
1. Microfluidic chip with Luer interface
2. Standard syringe

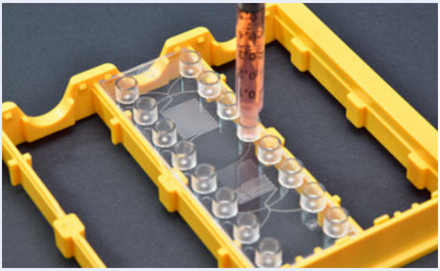


Fig. 855: Microfluidic chip with Luer interfaces filled with a standard syringe

Hints to work with female Luer interfaces on chip:

Option 2: Female Luer interface as pipetting interface or reservoir

Another option how to use chips with female Luer interface is to insert the liquid with a pipette or to use the female Mini Luer interfaces as reservoirs.

Required item:
1. Microfluidic chip with Luer interface
2. Conventional pipette

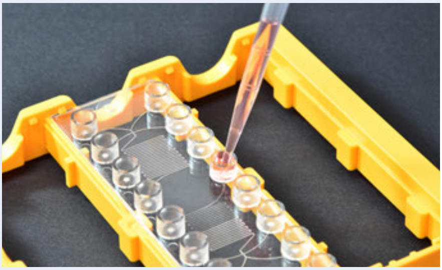


Fig. 856: Microfluidic chip with Luer interfaces filled with a pipette and interfaces used as reservoir

Hints to work with female Luer interfaces on chip:

Option 3: Female Luer interface combined with male Luer counterpart

Required item:

1. Microfluidic chip with Luer interface, e.g. micro mixer chip (10000018)
2. Handling frame, e.g. orange (10000043)
3. Male Luer fluid connectors, e.g. the green version (10000081)
4. Male Luer plugs, e.g. the black version (10000231)
5. Silicone tube, e.g. ID: 0.5 mm (10000033)
6. PTFE tube, e.g. ID: 0.5 mm (10000032)
7. Peristaltic pump
8. Tube for peristaltic pump
9. Eppendorf vessel

Fig. 857: Required items for Luer interface demo

Step 1: Chip & handling frame

1. Insert the microfluidic chip in a handling frame for microfluidic chips in microscopy slide format

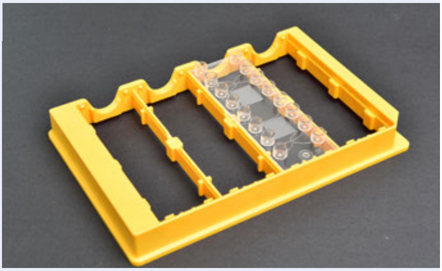


Fig. 858: Micromixer inserted in handling frame

Step 2: Luer connector & silicone sleeve

2. Interface the Luer fluid connector with a small piece of silicone tube

Fig. 859: Green Luer fluid connector attached to silicone sleeve

Step 3: Silicone sleeve & PTFE tube

3. Interface the Luer fluid connector with the mounted silicone sleeve with the PTFE tube

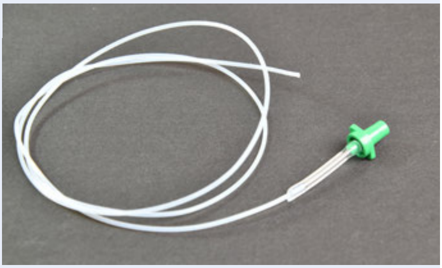


Fig. 860: sleeve with a PTFE tube

Step 4: Insert connector on chip

4. Insert the Luer fluid connector connected with silicone sleeve and PTFE tubing with a twist on the female interface on chip

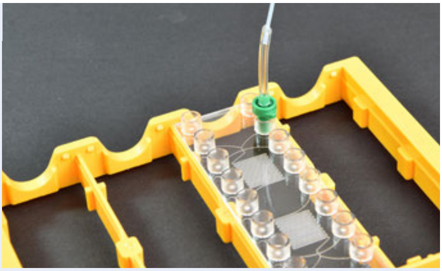


Fig. 861: Insertion of the Luer with tubings in fluid entrance of the chip

Step 5: Insert connector on exit & connect to collection vessel

5. Insert a second Luer fluid connector connected with silicone sleeve and PTFE tubing with a twist on the female interface on chip and place the end of the PTFE tube in an Eppendorf vessel for sample or waste collection

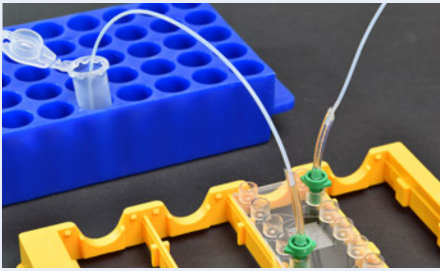


Fig. 862: Insertion of the Luer with tubings in fluid exit of the chip and connection of tube with sampling vessel

Step 6: Close unused ports with plugs

6. Close all unused fluid entrance and fluid exit ports of the fluidic pathway used on chip with Luer plugs.

Fig. 863: Close unused fluid ports on chip with red Luer plugs

Step 7: Connect chip with pump

7. Connect the PTFE tube with the tube inserted in the pump

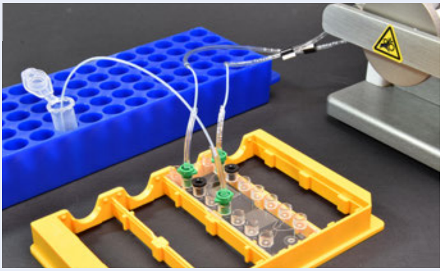


Fig. 864: Connection of the chip via the PTFE tube with the pump

15.1.3 How to work with olive interfaces

Olive interfaces are simple connectors to be manually connected with tubes like the best known example of our daily life, the hose pipes. Tubes can be directly connected to such chips. They are well suited for manual handling, but automated approaches moving the silicone sleeve over the olive are possible as well, even if difficult to realize. This chapter summarizes the different options to work with olive interfaces on chip and how to operate chips with such interfaces.

Hints to work with olive interfaces on chip:

Olive interfaces connected through silicones sleeves and PTFE tube to pump

Required item:
1. Microfluidic chip with olive interface, e.g. straight channel chip (10001841)
2. Handling frame, e.g. orange (10000043)
3. Silicone tube, e.g. ID: 0.5 mm (10000033)
4. PTFE tube, e.g. ID: 0.5 mm (10000032)
5. Peristaltic pump
6. Tube for peristaltic pump
7. Eppendorf vessel

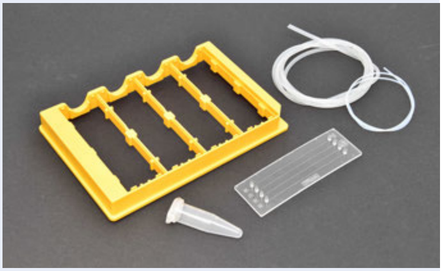


Fig. 865: Required items for olive interface demo

Step 1: Chip & handling frame

1. Insert the chip in a handling frame

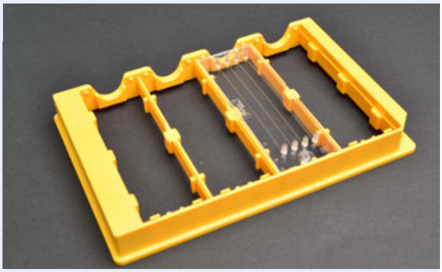


Fig. 866: Microfluidic chip with olive interfaces inserted in a microfluidic chip handling frame

Step 2: Connect PTFE tubes with silicone sleeves

2. Connect two times a short silicone tube with a longer PTFE tube

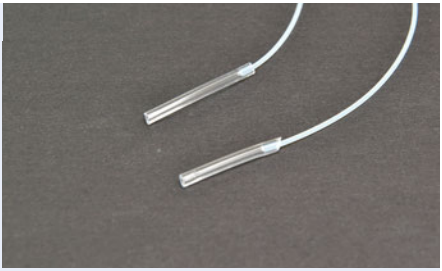


Fig. 867: Short pieces of silicone tubes connected with PTFE tube

Step 3: Interface chip & tube

3. Interface the olives on chip through the silicone sleeves with the PTFE tube

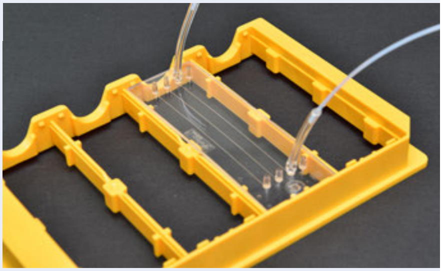


Fig. 868: Chip with olive interfaces connected with tubes

Step 4: Insert tube in pump tube

4. Insert the PTFE tube in the tube of the pump

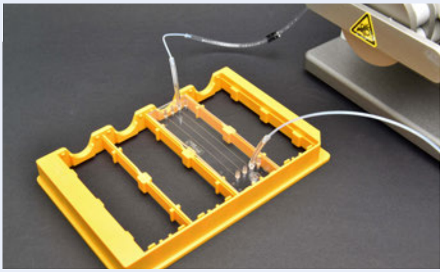


Fig. 869: Chip with olives connected via tubes to a peristaltic pump

Step 5: Tube, pump & reservoir vessel

5. Connect the tube of the pump with a PTFE tube with the reservoir vessel

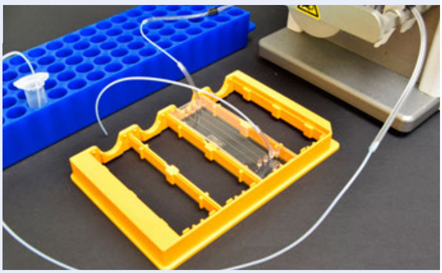


Fig. 870: Pump tube connected to reservoir vessel

Step 6: Connection collection vessel & start pumping

6. Connect the exit tube with a collection vessel and start pumping

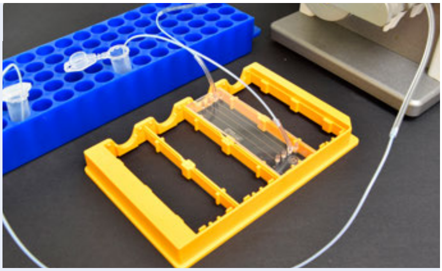


Fig. 871: Chip with olives connected via tubes to a pump addressing a reservoir vessel from the outlet

15.2 Droplet generator chip – options to use the chip

Droplet generator chips offer a lot of possibilities how to use them and to optimize the results. Besides the structure itself, the operation mode matters. Sample inlet and main stream channel might be varied, a hydrophobic surface coating may be applied, or simple variation of the flow velocity or the injection volume can be modified, resulting in different droplet patterns. The following description aims to give an idea how to start with such devices followed by a set of further experiments.

Hints to work with droplet generator:

Droplet generator chip 0162

Required item:
1. Droplet generator chip, material PC (polycarbonate), (10000176)
2. Handling frame, e.g. orange (10000043)
3. Male Mini Luer fluid connectors, e.g. the green version (10000029)
4. Male Mini Luer fluid connectors, e.g. the opaque version (10000094)
5. Male Mini Luer plugs, e.g. the red version (10000053)
6. Silicone tube, e.g. ID: 0.5 mm (10000033)
7. PTFE tube, e.g. ID: 0.5 mm (10000032)
8. Oil, e.g. 10001079 and surfactant to add
9. Appropriate pump
10. Tube for pump
11. Eppendorf vessel
12. Microscope
13. Computer

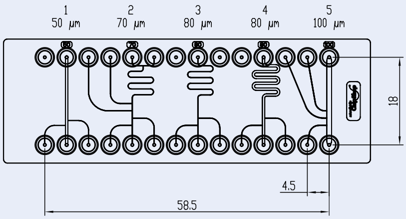


Fig. 872: Droplet generator Fluidic 285

Step 1: Chip & handling frame

1. Required items as describe above

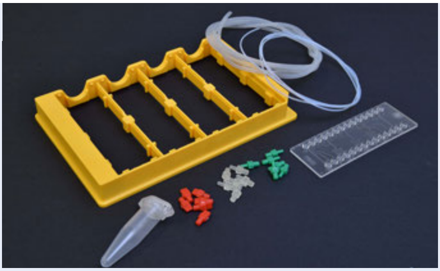


Fig. 873: Required items for droplet generation

Step 2: Chip & handling frame

2. Insert the chip i a handling frame

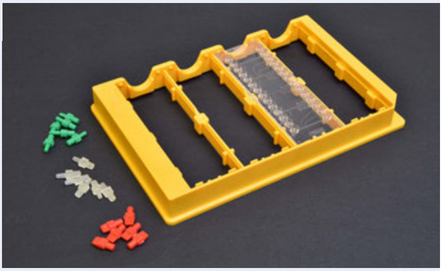


Fig. 874: Droplet generator Fluidic 285 placed in handling frame

Step 3: Interface chip

3. Interface the mini Luer connector with a silicon sleeve and connect it to the PTFE tube

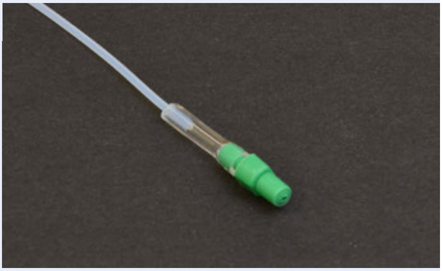


Fig. 875: Mini Luer to fluid connector with silicon sleeve and PTFE tube

Step 4: Interface chip & connect oil phase

4. Connect the ports for the oil phase via a green mini Luer connectors, a silicone sleeve and PTFE tube to the pump tube

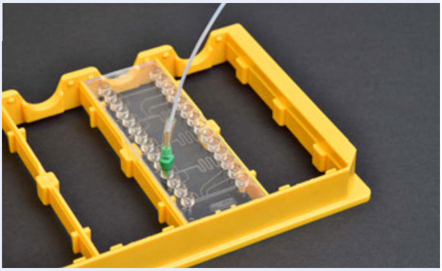


Fig. 876: Droplet generator with connected oil phase

Step 5 - 6: Interface chip & connect aquaeous phase

5. Connect the port for the aqueous phase vian a opaque mini Luer connects, a silicon sleeve and PTFE tube to the pump tube
6. Plug the unused entrance port of the chip with a red mini Luer plug

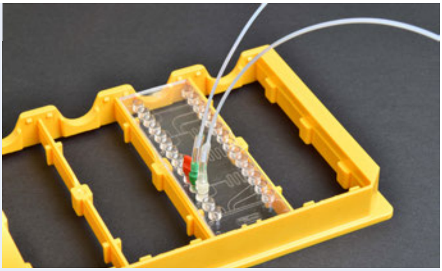


Fig. 877: Droplet generator with connected aqaeous phase and closed redundant inlet

Step 7 – 9: Connect outlet & carry out experiment

7. Connect the exit port via a mini Luer connector, a silicone sleeve, and PTFE tube to the Eppendorf tube
8. Start pumping the oil and wait for a stable flow
9. Start pumping the aqueous phase and observe droplet generation. You have to vary the flow rate of the aqueous phase to generate droplets of the desired size

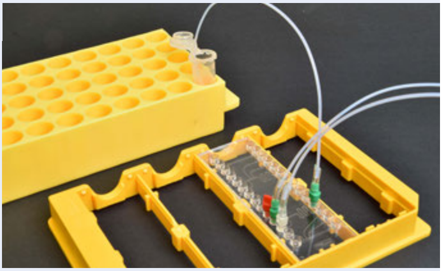


Fig. 878: Complete experimental setup with the exit port of the droplet generator connected to a collection vessel

Step 10: Visualisation

10. Visualize the experiment with a microscope and characterize the droplet size

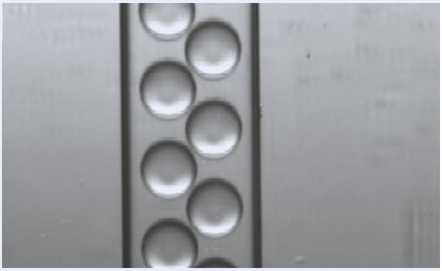


Fig. 879: Droplets generated on chip

15.3 On-chip DNA isolation with ChipGenie® edition P using magnetic beads

This chapter describes a procedure using ChipGenie® edition P for the isolation of genomic DNA e.g. for downstream PCR out of a variety of samples such as blood or pathogen-containing liquids. To do so, magnetic beads that bind DNA from cells (blood or bacteria) are added to a sample mixture which is afterwards injected into a compatible microfluidic chip. After a washing procedure, the purified DNA is extracted from the beads inside the chip. Depending on the sample and application, the single steps described below vary slightly.

The instructions describe the basic steps which are necessary for the on-chip DNA isolation from full blood using the ChipGenie® edition P starter kit 3, to obtain PCR-competent genomic DNA in less than 30 min.

Required tools & ingredients:

1. ChipGenie® edition P instrument (10000166)
2. ChipGenie® edition P starter kit 3 (10001673)
3. A waste reservoir (e.g. Eppendorf tube or falcon tube)

The application procedure includes:

1. The preparation of the chip
2. The on-chip sample lysis and DNA purification
3. The DNA elution

Chip preparation:
Take a suitable microfluidic chip, here the rhombic chamber chip (Fluidic172) and close the excess inlet and outlet ports using a mini-Luer plug. Optionally, equip the open inlet ports with a Luer-to-pipette adapter, to simplify the liquid handling using a conventional pipette.

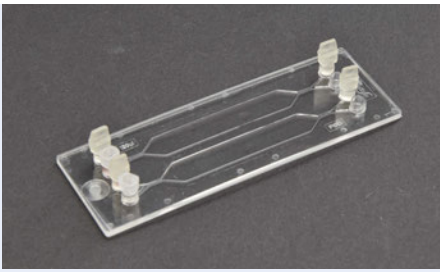


Fig. 880: Rhombic chamber chip equipped with mini-Luer connectors and mini-Luer-to-pipette adapters.

Instrument preparation:
Place the chip inside the instrument and close the holding frame. Insert mini-Luer-to-fluid connectors into the open outlet ports, which were beforehand equipped with a silicon sleeve and PTFE tubing.

Fig 881: Chip inserted into ChipGenie® edition P instrument and installed connectors with silicone sleeve and PTFE tubing.

Sample lysis and purification:
For lysis, mix the blood sample with the provided mcs lysis buffer and incubate the mixture at RT inside an Eppendorf tube. Add the provided magnetic beads and mcs wash buffer 2 to this mixture and inject it into one of the rhombic chambers using a pipette. Incubate the mixture with the switched on magnetic mixer to achieve binding of the DNA to the beads. Afterwards, empty the chamber by flushing it with air with the help of a pipette. Now, stepwise purification of the DNA attached to the magnetic beads is done, by subsequently injecting mcs wash buffers 1, 2 and then 3 into the rhombic chambers. Each of this purification steps is thereby carried out with the switched on magnetic mixer. At last, the chamber is emptied again by flushing it with air.

Fig 882: ChipGenie® edition P instrument with a blood sample inside the rhombic chamber. The magnetic beads, migrating through the chambers, are visible as black bars.

DNA elution:
In the final step, mcs elution buffer is injected into the chamber leading to the extraction of the purified DNA from the magnetic beads. The efficiency of this is improved by switching on the magnetic mixer and a adjusting a temperature of 50 °C, with the help of the heating element inside the ChipGenie edition P instrument. The mini-Luer connector is disconnected from the outlet ports and the eluate is aspirated with the help of a pipette.

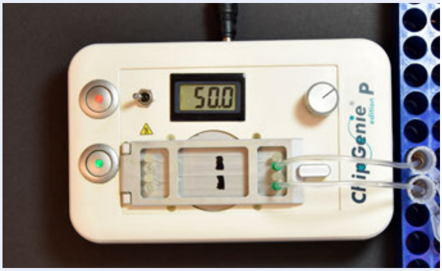


Fig. 883: ChipGenie® edition P instrument with washing buffer inside the rhombic chamber.

15.4 Membrane chip

microfluidic ChipShop membrane chips can be equipped with various membranes to be used for simple filtration tasks, for the implementation of assays on the membrane, or for plasma generation.

15.4.1 On-chip plasma generation out of whole blood

The membrane chip enables you to generate blood plasma from 20-40 μl of whole blood (stabilized or non-stabilized) within less than 2 minutes. The yield is roughly 50% of plasma. A special membrane inside the chip retains all blood cells. The pure plasma migrates through the filter.

Required tools & ingredients

1. Chip with 4 plasma generation membranes (10000021)
2. Mini Luer plugs (10000030)
3. Eppendorf vessel

The application procedure includes three steps:

1. Preparation of the chip
2. Sample loading
3. Filtration

Preparation steps:
The ventilation ports of the membrane chip are closed with Mini Luer plugs and the chip is placed on a bench in the shown orientation.

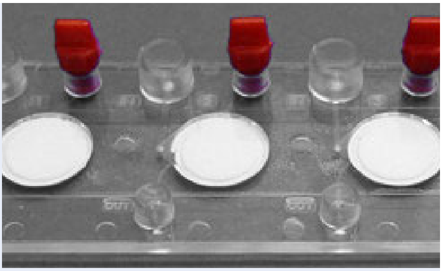


Fig. 884: Membrane chip Fl. 200 with Mini Luer plugs

Sample loading:
Pipette the designated volume (between 20 and 40 μl) of whole blood into Luer-inlet-port of the membrane chip.

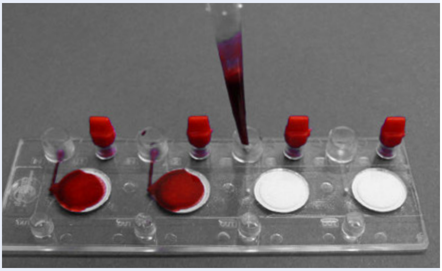


Fig. 885: Insertion of blood in membrane chip

Filtration:
Use a pipette (for yellow tips) with a set volume of 100 μl. Press the pipette tip tightly into the sample outlet port and suck slowly for ~30 sec. Formation of air bubbles during filtration is normal and has no effect on the generated plasma. Fill the filtrated plasma into a fresh Eppendorf tube.

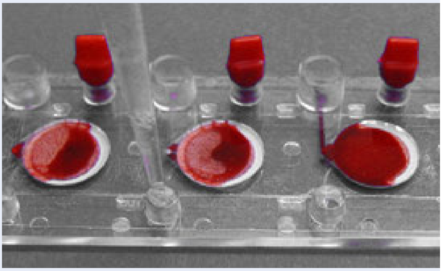


Fig. 886: Plasma take up

Results:
Based on your starting volume, between 10 and 20 μl of blood plasma will be generated. It should be clear, light yellow and free of blood cells.

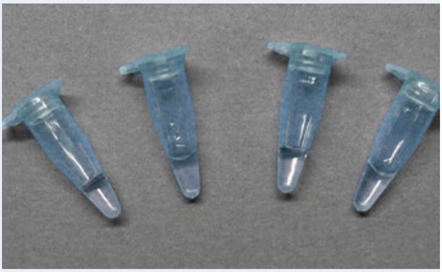


Fig. 887: On-chip generated plasma

15. 5 Cell culture with Lab-on-a-Chip Cell Culture Incubator LOC-CCI 1

An easy handling of cell cultures can be achieved with the help of the **Lab-on-a-Chip Cell Culture Incubator** LOC-CCI 1 allowing for a short and long term CO_2-independent cell culture.

The **Lab-on-a-Chip Cell Culture Incubator** LOC-CCI 1 has to be equipped with a consumable microfluidic device, the cell culture itself has to be inserted with the help of a pipette, tubing has to be connected and everything is placed on the stage of a microscope. Heater and pumps have to be accommodated to the respective cell culture conditions. Either static media supply or continuous flow can be used for medium exchange or cell treatment. Cell based assays can be performed over a few hours up to several weeks according to the experimental needs.

Preparation step:
Insert cell culture on chip with pipetteInsert chip in Lab-on-a-Chip Cell Culture Incubator LOC-CCI 1

Fig. 888: Rhombic chamber chip placed in Lab-on-a-Chip Cell Culture Incubator – LOC CCI 1

Preparation step:
Connect chip and Lab-on-a-Chip Cell Culture Incubator LOC-CCI 1 with external pumps

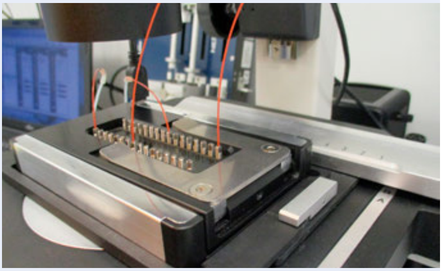


Fig. 889: Lab-on-a-Chip Cell Culture Incubator – LOC CCI 1 with embedded chip and capillaries for the connection of pumps

Preparation step:
Place chip and Lab-on-a-Chip Cell Culture Incubator LOC-CCI 1 and define pump rate and heating conditions: Run experiments

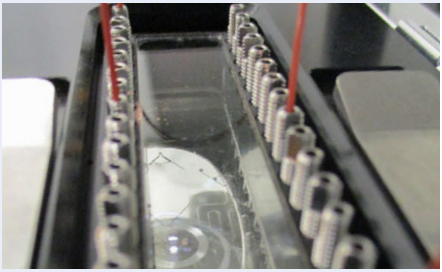


Fig. 890: Lab-on-a-Chip Cell Culture Incubator – LOC CCI 1 during use on microscope stage

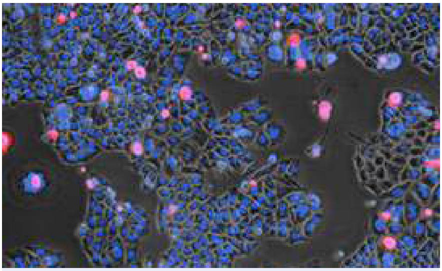


Fig. 891: Cell culture carried out in CO_2-incubator

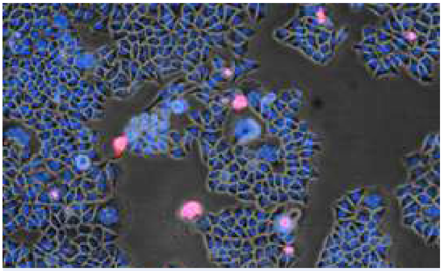


Fig. 892: Cell culture done in Lab-on-a-Chip Cell Culture Incubator – LOC CCI 1

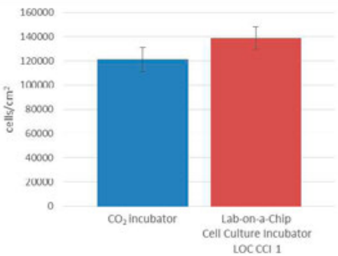
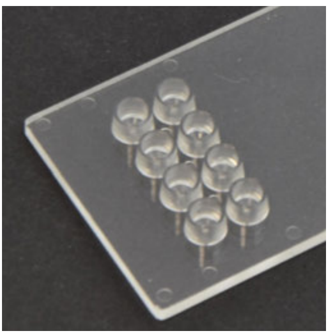


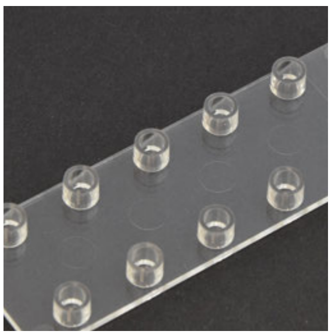
Fig. 893: Comparison of cell culture done in CO_2-incubator and Lab-on-a-Chip Cell Culture Incubator – LOC CCI 1

That CO_2-independent cultivation of cells in the Lab-on-a-Chip Cell Culture Incubator – LOC CCI 1 leads to slightly increased proliferation in comparison to common CO_2-incubator-based cell culture.

Product Code	Description	Price [€] included adapter plate 2x8	2x16
10000743	LOC CCI 1 with heating elements (incl. 1 adapter plate of your choice)	2,371.87	
10001216	Additional adapter plate	390.00	390.00

Product Code	Description	Detail		Price [€]
10001701	LOC-CCI 1 starter kit 1	- Male Mini Luer plugs, red, material: PP (10) - Rhombic chamber chip, 120 µl chamber volume, 500 µm channel depth, hydrophilized, material: Topas (10) - Rhombic chamber chip, 100 µl chamber volume, 600 µm channel depth, hydrophilized, material: Topas (10) - Rhombic chamber chip, 250 µl chamber volume, 800 µm channel depth, hydrophilized, material: Topas (10)	10000053 10000244 10000405 10000365	638.32





16 Fabrication services

Fabrication services

The main part of our work is dedicated to the realization of custom-designed chips. We assist in the proper microfluidic design, the adoption of the design to fabrication needs, as well as the choice of the appropriate fabrication technology.

In order to assist you in your design work, chapter **16.1 General design guidelines for polymer-based microfluidic devices** helps you to judge the feasibility of design features of microfluidic chips.

In chapter **16.2 Backend processing services** you will learn which further services we offer to enhance your customized microfluidic chip.

Chapter **16.3 Design-your-Lab Concept – *microfluidic ChipShop's* fluidic platforms** helps you in making the proper choice of, for example, proprietary microfluidic chip formats versus standard formats or of the appropriate fluidic interface, also considering cost and functional aspects.

16.1 General design guidelines for polymer-based microfluidic devices

16.1.1 At a glance - from prototyping to volume production

The manufacturability of a device depends on the individual design and the interaction between its various design elements. In this respect, the following design guidelines for polymer-based microfluidic devices give the user a better understanding of possible limitations in the design of a specific structure. For the microfluidic design, two aspects besides the functionality have to be considered right at the start of the design process: It must firstly be checked whether the design can be realized by replicative technologies – allowing for low-cost mass-manufacturing – like injection molding, and secondly whether the back-end processes, in particular the assembly (usually the secure sealing of the fluid with a cover lid), can be ensured.

In order to ensure translatability of your prototype to a mass fabricated device, we recommend to carry out prototyping using a material and fabrication method that is closely related to your envisaged upscaled production.

Even for prototyping, we work from the beginning either with directly milled thermoplastic prototypes that are largely comparable to molded parts or with injection molding, made affordable by a strict standardization concept.

16.1.2 Prototyping - Micromilling of polymers

For low volume prototyping we offer direct mechanical micromilling of thermoplastic polymers. *microfluidic ChipShop* offers a large range of standard formats such as microscope slides, double slides or wafers in various diameters, which we stock in each of our standard materials, serving as blanks for micromilling of prototypes. An overview of standardized, blank interface platforms can be found in chapter 16.3 Fluidic platforms for custom design.

Some details for milled polymer prototypes at *microfluidic ChipShop:*

- Fabrication starting from 5 pieces
- Smallest feature size around 50 µm width
- Surface roughness around 1 µm, due to limited polishing possibilities

While direct milling is a great way to quickly and cost-effectively test a design, it also comes with some constrains such as relatively high surface roughness, that is not suitable to evaluate optical readouts. Also, if very low feature size and very accurate z-positioning is required within your design, we recommend to start with injection-molded parts directly.

Please contact us at inquiries@microfluidic-ChipShop.com to discuss your milled prototype.

Fig. 894: Milling of various design features using a standardized interface platform

Fig. 895: Details of channels and chambers produced by milling a thermoplastic polymer platform

16.1.3 Injection molding of polymer-based microfluidic devices

For medium-scale prototyping and larger-scale production injection molding is the method of choice. Here, either standardized formats (see 16.3) can be used or a customer-specific format can be implemented. In either case, certain design rules have to by followed when designing a mold insert for your injection molded microfluidic device.

Besides the purely technical constraints, cost considerations can also have an influence on the chosen manufacturing route, as different methods for mold insert fabrication have different technical constraints (minimum feature size, maximum height, surface roughness, etc.) as well as different cost ranges.

Please consider the list below for your injection molded part:

a) Feature density

In order to allow for a good bond between a structured part and a cover foil, two adjacent channels or similar features should be separated by at least twice their width, but not less than 200 μm.
Not more than 50% of the overall surface area should be covered with structural elements.

b) Distance to device edges

In order to allow for a good bond, features should have a minimum distance from the edge of the device of 2 mm. The larger the device and the feature size, the larger this distance should be.

c) Minimum feature depth

Structures should have a minimum depth of 5 μm for features < 100 μm. For features between 100 and 1000 μm, the minimum depth is 15 μm.

d) Minimum residual thickness of the device

The minimum residual thickness of the device in structured areas is 500 μm for areas > 1 cm^2. For smaller areas, a lower residual thickness might be possible, depending on the overall device layout.

e) Maximum feature width

There is no practical limit to the feature width, however in the case of features wider than 4 mm, support structures to prevent the cover lid from sagging might have to be included in the design.

f) Aspect ratio

For injection molded parts, the aspect ratio for microstructured elements should be less than 2.

g) Through-holes

The minimum diameter of through-holes realized by standard core pins is 500 μm. Smaller holes can be realized with additional means upon request.

h) Open areas

Open areas (see Fig. 896) are possible.

Fig. 896: Through-holes, open and structured areas

16.1.3.1 General design guidelines for mechanically machined mold inserts

For mold inserts fabricated using precision machining for example in brass or stainless steel), the following design restraints are valid in addition to the ones given above:

a) Minimum feature size

The minimum feature size for sunk features (i.e. features where the mold insert material has to be removed; see Fig. 787) is 50 μm. For features in the range between 50 and 100 μm, the aspect ratio is limited to 1.5.

b) Minimum radius of curvature

At intersecting features (e.g. channel crossings), a radius of curvature of 40 μm occurs as standard. Smaller radii down to 10 μm are available upon request and depend on the aspect ratio of the respective structure

c) Feature heights

Different height steps as well as slopes of up to 45°–90° (depending on absolute feature size) are possible.

d) Surface roughness

Mechanical machining results in a surface roughness of the order of 0.5–1 μm RMS. The features can be polished if protruding (e.g. channel floors in the polymer part which are ridges in the mold insert; see Fig. 788), to create an optical finish (roughness < 50 nm RMS).

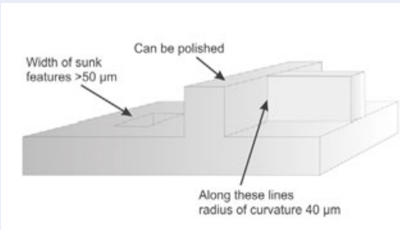


Fig. 897: Features of a milled mold insert

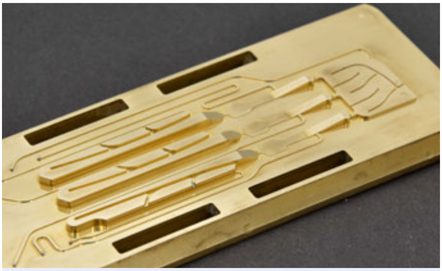


Fig. 898: Mold insert realized using ultraprecision mechanical machining

16.1.3.2 General design guidelines for mold inserts fabricated using lithography and electroplating

For mold inserts fabricated using lithography and electroplating (either e.g. from a silicone or glass master), the following design restraints are valid in addition to the ones given above:

a) Minimum feature size

The minimum feature size is 10 μm. For features in the range between 10 and 100 μm, the aspect ratio is limited to 1.5.

b) Maximum height

For lithography-based mold inserts, the maximum feature height is 100 μm.

16.2 Backend processing services

At *microfluidic ChipShop* we offer a variety of services to further modify your microfluidic chip. Those include:

a) Surface modification

Thermoplastic materials are natively hydrophobic with water contact angles >80°. Several technologies are available to render them more hydrophilic. We can offer both physical hydrophilization as well as chemical surface modification processes. Furthermore, also local surface modification processes are available however keep in mind that any process that requires masking will lead to increased production cost.

b) Reagent integration

To integrate reagents, we provide options for both liquid and dry reagent integration. For liquid reagent integration, please see our blister and tank options (chapter 8). Dry reagents can be integrated either as lyophilized reagents for which we offer protocol development or via spotting and air drying.

Fig. 899: Spotter technology available at *microfluidic ChipShop* for reagent integration

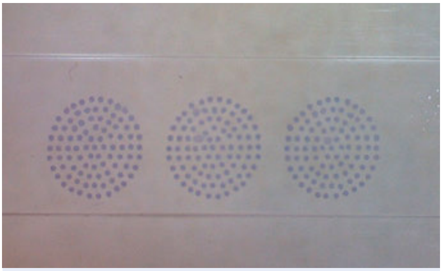


Fig. 900: Spotted probes (diameter 80 μm) in straight channel chip 272

16.3 Design-your-Lab Concept – *microfluidic ChipShop's* fluidic platforms

The investment in an injection-molding tool is quite frequently between the choice of a chip in a unique outer format and an existing format. *microfluidic ChipShop's* unique "Design-your-Lab Concept" enables you to benefit from existing injection-molding tools for quite common microfluidic chip formats like the microscopy slide, the microtiter plate, or the CD, avoiding the costs of investing in your own injection-molding tool.

Within this chapter, our standard formats, including various kinds of fluidic interfaces, are summarized. The interfacing side of the device has a fixed geometry while the bottom part is free for your individual design. All platforms are available as blank slides with the respective interfaces. This allows a rapid prototyping of structures e.g. by direct mechanical machining of the microstructures into the slides. This method of prototyping yields devices which have an identical "look&feel" to a molded part including the fluidic interfaces and the chemical properties. The only difference to a molded part is the slightly increased surface roughness which gives the machined areas a matt appearance.

16.3.1 Microscopy slide format

The microscopy slide format (75.5 mm x 25.5 mm x 1.5 mm) is now an accepted standard in the lab-on-a-chip field and has several advantages: A handy format that makes manual manipulation easy, not too big and not too small, it fits perfectly onto any microscope, and handling frames can be used in order to place the microscopy slide inside and to work with existing laboratory equipment systems, for example for filling or read-out.

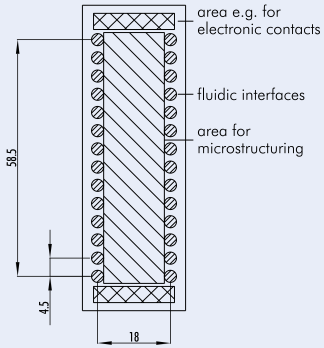


Fig. 901: Principle drawing of a microscopy slide with fluidic interfaces – in this version, fluidic interfaces are grouped along the long sides of the chip.

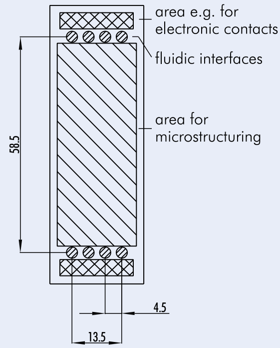


Fig. 902: Principle drawing of a microscopy slide with fluidic interfaces – in this version,fluidic interfaces are grouped along the short sides of the chip

The chip-to-world interface frequently remains a challenge – and standard solutions and solutions optimized for microfluidic applications are directly at hand. This raises two questions that are promptly answered by *microfluidic ChipShop's* fluidic platforms:

I. The kind of fluidic interface:

microfluidic ChipShop's microscopy slide formats are available with:

- Simple through holes
- Olives as tube interfaces
- Female Luer connectors
- Female mini Luer connectors

II. The position of the fluidic interface:

- Grouped along the long side with 9 mm spacing, corresponding to the spacing of a 96-well plate
- Grouped along the long side with 4.5 mm spacing, corresponding to the spacing of a 384-well plate
- Grouped along the short side with 4.5 mm spacing, corresponding to the spacing of a 384-well plate

As highlighted above, the range of fluidic interfaces offered with the microscopy slide format includes simple through-holes, olives, and Luer and Mini Luer connectors. All connectors are spaced according to the well-spacing of a 384-well microtiter plate, e.g. with a center-center distance of 4.5 mm between connectors except for the standard Luer connectors working with the spacing of a 96-well plate of 9 mm in order to allow pipetting robots or other automated equipment to be used.
One of the microscopy slide chip families is characterized by 16 interfaces with 4.5 mm spacing along the long side, which allows two rows of eight reagents from a microwell plate to be pipetted and the use of a conventional eight-times multipipette.

16.3.1.1 Microscopy slide platforms – Fluidic interface: Through holes

The **through-hole platforms** are frequently used with O-rings or membranes integrated in an instrument in order to give a proper sealing via press fittings. They are also a good interface for pipettes. One additional advantage of this interface besides the ease of application is the potential storage of the chips after use, as the interfaces can be sealed with tape to prevent contamination or evaporation. A drawback of this kind of interface is the low pressure stability on the chip-side of the connection, which has to be countered with a suitable counterpart on the instrument side. Standard diameter for the through-holes is 0.8 mm (top) and 0.5 mm (bottom); other diameters are available upon request.

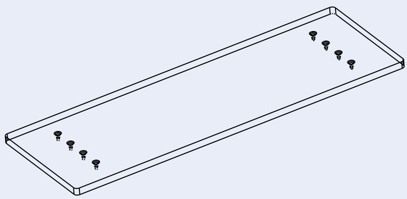


Fig. 903: Microscopy slide through-hole platform – version with eight fluidic interfaces

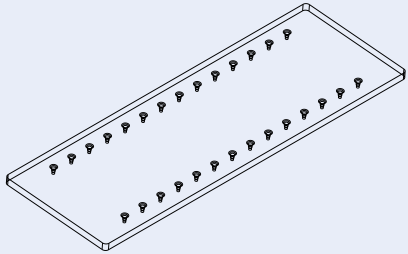


Fig. 904: Microscopy slide through-hole platform – version with 28 fluidic interfaces

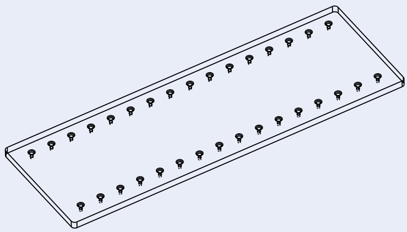


Fig. 905: Microscopy slide through-hole platform – version with 32 fluidic interfaces

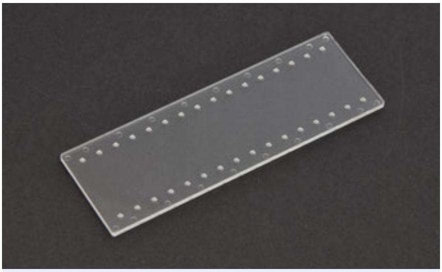


Fig. 906: Microscopy slide through-hole platform – version with 32 fluidic interfaces

Product Code	Description	Material	Price [€] 1+	10+
10000395	Microscopy slide platform 2 x 4 through-holes, pack of 10 slides	PMMA	55.00	30.00
10000483	Microscopy slide platform 2 x 4 through-holes, pack of 10 slides	PC	55.00	30.00
10000422	Microscopy slide platform 2 x 4 through-holes, pack of 10 slides	Topas	55.00	30.00
10000379	Microscopy slide platform 2 x 4 through-holes, pack of 10 slides	Zeonor	55.00	30.00
10000484	Microscopy slide platform 2 x 14 through-holes, pack of 10 slides	PMMA	55.00	30.00
10000485	Microscopy slide platform 2 x 14 through-holes, pack of 10 slides	PC	55.00	30.00
10000323	Microscopy slide platform 2 x 14 through-holes, pack of 10 slides	Topas	55.00	30.00
10000324	Microscopy slide platform 2 x 14 through-holes, pack of 10 slides	Zeonor	55.00	30.00
10000421	Microscopy slide platform 2 x 16 through-holes, pack of 10 slides	PMMA	55.00	30.00
10000486	Microscopy slide platform 2 x 16 through-holes, pack of 10 slides	PC	55.00	30.00
10000487	Microscopy slide platform 2 x 16 through-holes, pack of 10 slides	Topas	55.00	30.00
10000451	Microscopy slide platform 2 x 16 through-holes, pack of 10 slides	Zeonor	55.00	30.00

16.3.1.2 Microscopy slide platforms – Fluidic interface: Olives

Our **olive microfluidic platforms** enable a direct interface of tubing and microfluidic chips. For example, silicone tubes can be used to connect the olives with standard PE or PTFE tubing or PEEK capillaries. The silicone tubing easily slides over the tapered olives and guarantees a hermetic seal up to pressures of approximately 3 bar (42 psi). This connector is especially suited to non-automated experiments where syringes or other external pumps are to be connected to the chip. To minimize experimental variations due to the pressure-induced expansion of a longer silicone tube, short sections of silicone tubing can be used to connect stiff tubes (e.g. PTFE, PEEK, or PE tubing) with either the chip or the pump. This interface results in a dead volume of roughly 2 μl due to the internal volume of the olives which is added to the dead volume of the tubing.

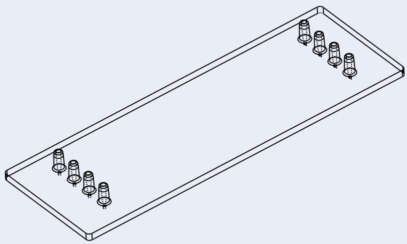


Fig. 907: Microscopy slide olive platform – version with eight fluidic interfaces

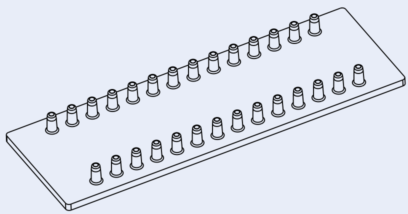


Fig. 908: Microscopy slide olive platform – version with 28 fluidic interfaces

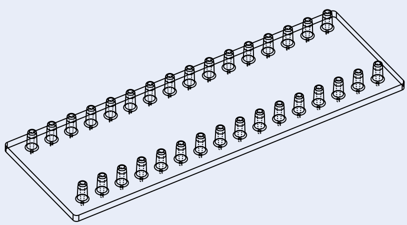


Fig. 909: Microscopy slide olive platform – version with 32 fluidic interfaces

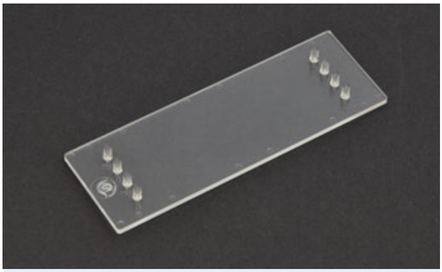


Fig. 910: Microscopy slide olive platform – version with eight fluidic interfaces

Product Code	Description	Material	Price [€] 1+	10+
10000478	Microscopy slide platform 2 x 4 olives, pack of 10 slides	PMMA	55.00	30.00
10000477	Microscopy slide platform 2 x 4 olives, pack of 10 slides	PC	55.00	30.00
10000476	Microscopy slide platform 2 x 4 olives, pack of 10 slides	Topas	55.00	30.00
10000475	Microscopy slide platform 2 x 4 olives, pack of 10 slides	Zeonor	55.00	30.00
10000474	Microscopy slide platform 2 x 14 olives, pack of 10 slides	PMMA	55.00	30.00
10000473	Microscopy slide platform 2 x 14 olives, pack of 10 slides	PC	55.00	30.00
10000472	Microscopy slide platform 2 x 14 olives, pack of 10 slides	Topas	55.00	30.00
10000471	Microscopy slide platform 2 x 14 olives, pack of 10 slides	Zeonor	55.00	30.00
10000470	Microscopy slide platform 2 x 16 olives, pack of 10 slides	PMMA	55.00	30.00
10000469	Microscopy slide platform 2 x 16 olives, pack of 10 slides	PC	55.00	30.00
10000468	Microscopy slide platform 2 x 16 olives, pack of 10 slides	Topas	55.00	30.00
10000465	Microscopy slide platform 2 x 16 olives, pack of 10 slides	Zeonor	55.00	30.00

16.3.1.3 Microscopy slide platforms – Fluidic interface: Luer

Our **Luer platforms** are equipped with standard Luer connectors known from the medical field and are especially suited for operations working with a male Luer counterpart, as is found in conventional syringes. This opens the way for manual operations and the direct transfer of samples taken with a syringe to the chip. Furthermore, they are perfectly suited as press-fittings to connect with an instrument. Luer microfluidic platforms are available with either Luer connectors on either side with a symmetrical arrangement and 9 mm spacing or five Luer connectors on either side with a spacing of 13.5 mm and an offset of 2.5 mm from the center. The Luer connectors ensure leak-tight connections up to pressures of several bar, enough for complex chips with comparatively high back-pressures.

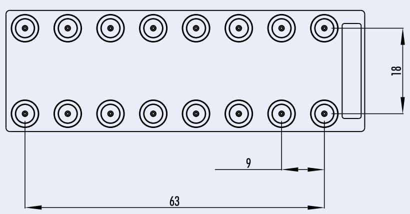


Fig. 911: Microscopy slide Luer platform – version 16 fluidic interfaces

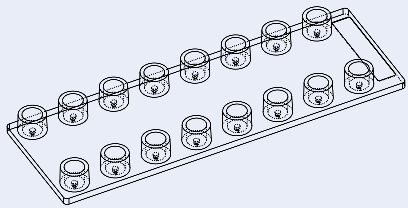


Fig. 912: Microscopy slide Luer platform – version 16 fluidic interfacs

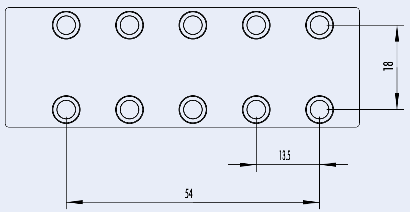


Fig. 913: Detail of the microscopy slide Luer platform with ten fluidic interfaces

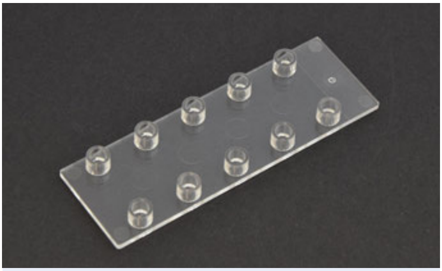


Fig. 914: Example of microscopy slide Luer platform with ten Luer interfaces

Product Code	Description	Material	Price [€] 1+	10+
10000393	Microscopy slide platform 2 x 5 Luer connectors, pack of 10 slides	PMMA	55.00	30.00
10000479	Microscopy slide platform 2 x 5 Luer connectors, pack of 10 slides	PC	55.00	30.00
10000480	Microscopy slide platform 2 x 5 Luer connectors, pack of 10 slides	Topas	55.00	30.00
10000481	Microscopy slide platform 2 x 5 Luer connectors, pack of 10 slides	Zeonor	55.00	30.00
10000403	Microscopy slide platform 2 x 8 Luer connectors, pack of 10 slides	PMMA	55.00	30.00
10000482	Microscopy slide platform 2 x 8 Luer connectors, pack of 10 slides	PC	55.00	30.00
10000407	Microscopy slide platform 2 x 8 Luer connectors, pack of 10 slides	Topas	55.00	30.00
10000406	Microscopy slide platform 2 x 8 Luer connectors, pack of 10 slides	Zeonor	55.00	30.00

16.3.1.4 Microscopy slide platforms – Fluidic interface: Mini Luer

The Mini Luer microfluidic platforms combine the same advantages as their larger counterparts, with reduced dimensions (outer diameter 4 mm instead of 6 mm), thus allowing for more connectors on the chip. Up to 16 ports along the long side of a microscopy slide can thus be realized. Fluidic 1633 features four additional Mini Luer interfaces in the center of the chip, allowing structures to start or end in the middle of the chip.
Male Mini Luer plugs for closing the Mini Luer interface are available as well as adapter pins to connect silicone tubing to these chips, which increases the versatility of the various Mini Luer platforms.

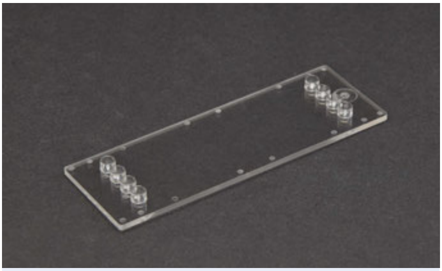


Fig. 915: Mini Luer platform with eight fluidic interfaces

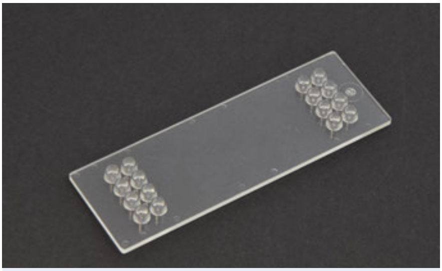


Fig. 916: Mini Luer platform with 16 fluidic interfaces

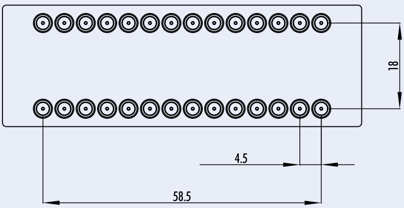


Fig. 917: Mini Luer platform with 28 fluidic interfaces on the long edges

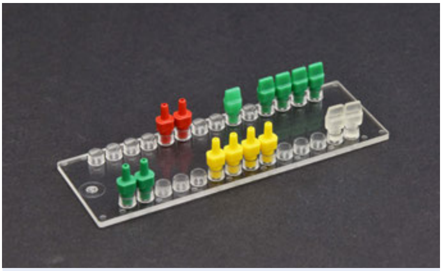


Fig. 918: Mini Luer platform with 28 fluidic interfaces on the long edges

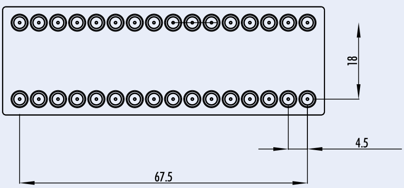


Fig. 919: Mini Luer platform with 32 fluidic interfaces on the long edges

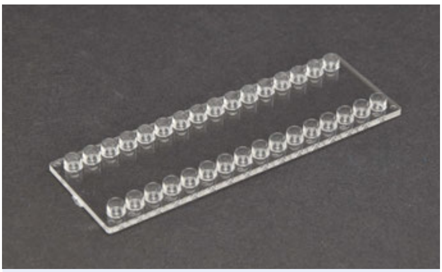


Fig. 920: Mini Luer platform with 32 fluidic interfaces on the long edges

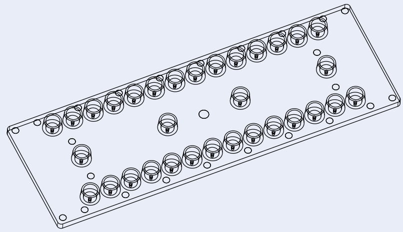


Fig. 921: Mini Luer platform Fluidic 1633 with 28 fluidic interfaces along the long side and 4 central interfaces

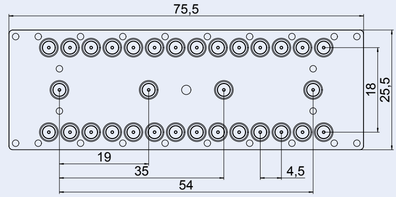


Fig. 922: Schematic drawing of the Mini Luer platform Fluidic 1633

Product Code	Description	Material	Price [€] 1+	10+
10000394	Microscopy slide platform 2 x 4 Mini Luer, pack of 10 slides	PMMA	55.00	30.00
10000488	Microscopy slide platform 2 x 4 Mini Luer, pack of 10 slides	PC	55.00	30.00
10000489	Microscopy slide platform 2 x 4 Mini Luer, pack of 10 slides	Topas	55.00	30.00
10000450	Microscopy slide platform 2 x 4 Mini Luer, pack of 10 slides	Zeonor	55.00	30.00
10000424	Microscopy slide platform 2 x 8 Mini Luer, pack of 10 slides	PMMA	55.00	30.00
10000490	Microscopy slide platform 2 x 8 Mini Luer, pack of 10 slides	PC	55.00	30.00
10000491	Microscopy slide platform 2 x 8 Mini Luer, pack of 10 slides	Topas	55.00	30.00
10000492	Microscopy slide platform 2 x 8 Mini Luer, pack of 10 slides	Zeonor	55.00	30.00
10000426	Microscopy slide platform 2 x 14 Mini Luer, pack of 10 slides	PMMA	55.00	30.00
10000427	Microscopy slide platform 2 x 14 Mini Luer, pack of 10 slides	PC	55.00	30.00
10000493	Microscopy slide platform 2 x 14 Mini Luer, pack of 10 slides	Topas	55.00	30.00
10000428	Microscopy slide platform 2 x 14 Mini Luer, pack of 10 slides	Zeonor	55.00	30.00
10000494	Microscopy slide platform 2 x 16 Mini Luer, pack of 10 slides	PMMA	55.00	30.00
10000423	Microscopy slide platform 2 x 16 Mini Luer, pack of 10 slides	PC	55.00	30.00
10000387	Microscopy slide platform 2 x 16 Mini Luer, pack of 10 slides	Topas	55.00	30.00
10000495	Microscopy slide platform 2 x 16 Mini Luer, pack of 10 slides	Zeonor	55.00	30.00

16.3.1.5 Microscopy slide platforms – Fluidic interface: Pipetting interface

The pipetting interface facilitates precice and easy filling of the chip, either in manual mode, or automatically via a pipetting robot. The conical shape of the interfaces make it compatible with different sizes and brands of pipetting tips.

The pipetting interface platform Fluidic 1632 features 16 pipetting ports along the long side of the chip, serving as inlet, and Mini Luer interfaces on the opposite side of the chip, serving as outlet.

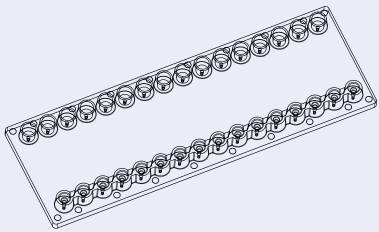


Fig. 923: Platform Fluidic 1632 with 16 pipetting interfaces at the long side of the chip and opposite Mini Luer interfaces

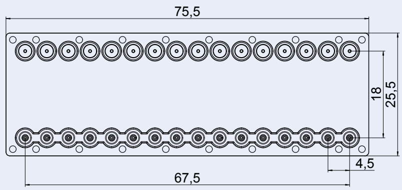


Fig. 924: Schematic drawing of the pipetting platform Fluidic 1632

16.3.1.6 Microscopy slide platforms – Integrated reservoir platform

The integrated reservoir platform Fluidic 1365 features 4 replicate units per chip. Each unit consists of three reservoir structures at their in- and outlets, with fixed dimensions. The maximum filling volume of each reservoir is 37.7 μl.

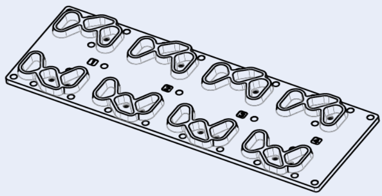


Fig. 925: Integrated reservoir platform Fluidic 1365

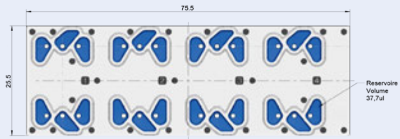


Fig. 926: Schematic drawing of the integrated reservoir platform platform with 37.7 μl reservoirs

16.3.2 Double slide format (75.5 mm x 50 mm x 2 mm)

The double slide format is an in-between solution of small microscopy slide and the microtiter plate. We offer two versions of this platform, either equipped with two double rows of 10 Mini Luer interfaces or two rows with six Luer interfaces each side in total. These designs allow for a large variety of fluidic interconnects in the development phase.

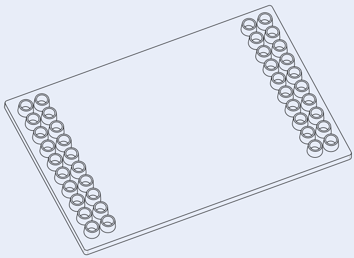


Fig. 927: Schematic drawing of double slide format - Fluidic 508

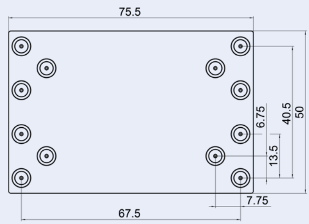


Fig. 928: Schematic drawing of double slide format - Fluidic 948 with 12 Luer interfaces

Product Code	Fluidic	Description	Material	Price [€] 1+	10+
10000503	508	Double slide platform 40 Mini Luer interfaces, pack of 10 substrates	PMMA	76.00	44.50
10000504	508	Double slide platform 40 Mini Luer interfaces, pack of 10 substrates	Topas	76.00	44.50
10000505	508	Double slide platform 40 Mini Luer interfaces, pack of 10 substrates	PC	76.00	44.50
10000506	508	Double slide platform 40 Mini Luer interfaces, pack of 10 substrates	Zeonor	76.00	44.50
10001311	948	Double slide platform 12 Luer interfaces, pack of 10 substrates	PMMA	76.00	44.50
10001312	948	Double slide platform 12 Luer interfaces, pack of 10 substrates	Topas	76.00	44.50
10001313	948	Double slide platform 12 Luer interfaces, pack of 10 substrates	PC	76.00	44.50
10001314	948	Double slide platform 12 Luer interfaces, pack of 10 substrates	Zeonor	76.00	44.50

16.3.3 Microtiter plate format

The combination of the microfluidic world with its advantages with the well-known world of laboratory automation is the merger of microfluidics with the SBS standard microtiter plate (85.48 mm x 127.76 mm). Directly available from *microfluidic ChipShop* are several injection-molding tools to allow for the fabrication of microfluidic networks on the microtiter plate, ensuring the outer rim of the SBS pattern also fits with existing automation set-ups. Taking laboratory automation into consideration during the design phase, namely by incorporating fluidic interfaces and optical detection areas according to the well spacing of the microtiter plates, allows the use of, for example, pipetting robots or conventional plate readers for optical detection.

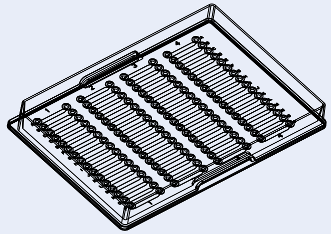


Fig. 929: Schematic drawing of one microfluidic microtiter plate

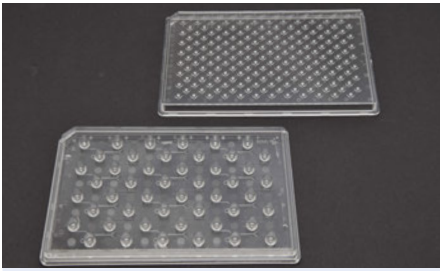


Fig. 930: Example of one of *microfluidic ChipShop's* microfluidic microtiter plates

16.3.4 ¼ Microtiter-plate format

For those applications which do not require the full size of a microtiter plate, a variation with a footprint of one-quarter of the titerplate is also available. This is particularly relevant for instruments with tighter size restrictions.

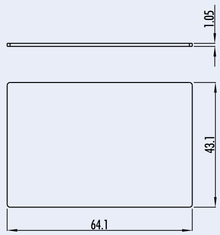


Fig. 931: Schematic drawing of 1/4 microtiter-plate

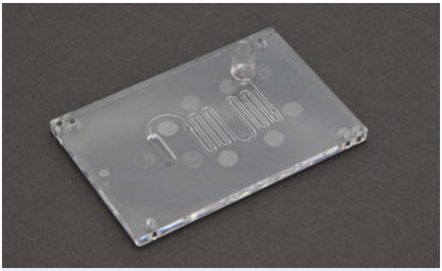


Fig. 932: Example for 1/4 microtiter-plate, realized within EU-FP7 project "CD-Medics", No. 216031. Design: IMM

16.3.5 Extended size I platform format

This platform is for those who require chips in a long and narrow format (95 mm x 16 mm). Microstructured examples in this chip format are our electrophoresis chips. The platform is available with through-holes as well as with Luer connectors.

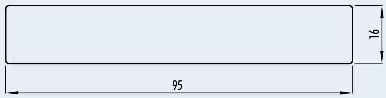


Fig. 933: Schematic drawing of the extended size I platform

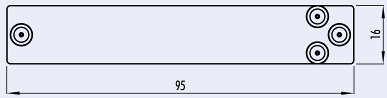


Fig. 934: Schematic drawing of the extended size I platform with Luer interfaces

16.3.6 CD-format

For applications making use of liquid transport by centrifugal forces, a CD-sized tool is available. Please note that for this format, the central hole with a diameter of 15 mm is required plus the CD clamping region with diameter of 25 mm centered around the hole which cannot be used for structuring. Only open-hole fluidic access is possible in this format.

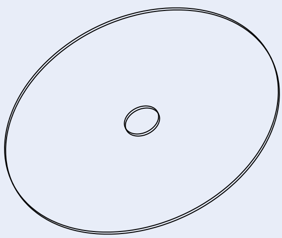


Fig. 935: Schematic drawing of the CD-platform

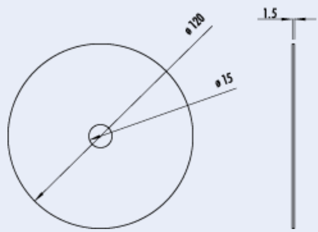


Fig. 936: CD-platform with measures

16.3.7 Pie-slice plate

A variation of the centrifugal platform is the pie-slice plate. This is a 60-degree sector of a circle and allows the modular assembly of different functions in different sectors of a disc. This format allows for higher fluidic volume applications than the CD format as it has a maximum thickness of 4 mm.

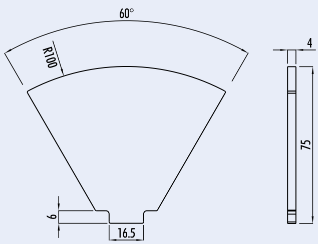


Fig. 937: Geometrical layout of the pie slice plate

Fig. 938: Examples of pie slice plate chips.
The chips were developed within the BMBF-Project "ZentriLab", FKZ 16SV2350.

16.3.8 Diagnostic platform

The diagnostic platform chip design allows the integration of an entire assay on chip. From sample preparation, reagent integration, amplification and readout to a clever waste storage concept – the platform chip can do it all. For more information, please refer to Chapter 18.

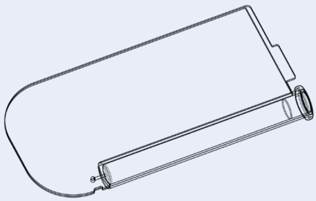


Fig. 939: Schematic drawing of the diagnostic platform

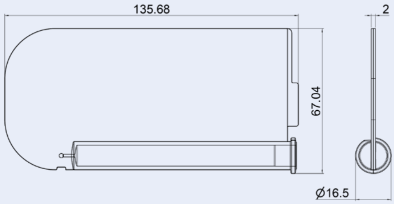


Fig. 940: Dimensions of the diagnostic platform

16.3.9 Handheld platform

The handheld platform is suited particularly to enable simple reagent uptake and/or release with its smart pipetting nozzle. The design is particularly popular for stand-alone analyses or sample preparation steps that do not require any further analysis equipment or readers. It comes with a cap, which can be produced in your CD color and with your logo. For more info, please refer to Chapter 17.

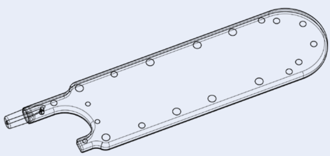


Fig. 941: Schematic drawing of the handheld platform

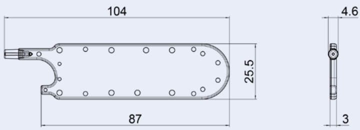
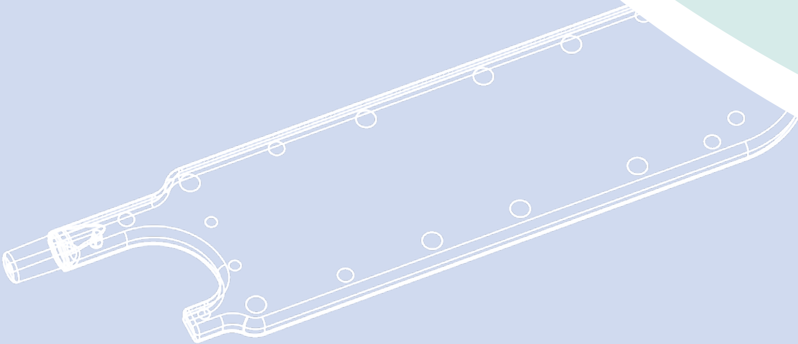
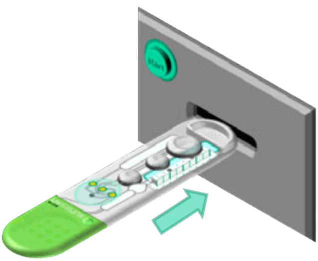


Fig. 942: Smart pipetting and sample uptake are possible with the handheld platform.





17 Versatile handheld microfluidic platform

The easiest sample handling in the palm of your hand

Liquid sample uptake, handling and metering can be tricky tasks, when designing a microfluidic chip for analytical purposes. The simple solution: *microfluidic ChipShop's* handheld platform!

Discover our standardized design concept to bring your Point-of-Care assay to life.

17 Handheld platform

The handheld platform by *microfluidic ChipShop* is a handy, universal POC platform that can easily be adopted to accommodate your analytical assay - various kinds of liquid samples and readouts are possible. With its unique sample uptake interface, sample collection becomes a piece of cake.

17.1 Handheld platform design concept

microfluidic ChipShop's handheld platform can be customized according to your specific assay needs. At the same time, many standard design elements for liquid uptake, sample handling, reagent and waste storage and assay readout are at hand to be directly implemented into your custom handheld design with simple sample in – result out handling.

Advantages of the handheld platform

- Simplified liquid sample uptake
- Stand-alone analytical device
- Reagent storage on chip
- Fast and simple prototyping due to standardization concept
- Different assay categories
- With and w/o instrumentation depend on assay

Possible sample matrices

- Blood
- Urine
- Saliva
- Other body fluids
- Milk and liquid foodstoff
- Water
- Emulsions

17.2 Possible workflows

The workflow of a handheld platform is as individual as the custom assay itself. However, standardized concepts can be applied and a few of them are listed below.

Fig. 943: Example for injection molded handheld cartrige

Fig. 944: Sample uptake via active finger pump

Fig. 945: Caps can be produced in different colors with your logo

Sample Uptake

With the unique sample uptake nozzle all kinds of liquid samples can easily be taken up. It comes in male Luer format to ensure compatibility to common lab equipment.

- Sample uptake possible from vacuette/monovette, lab tube, finger prick, hospital tubing system and other types of collection vessels like bottels
- Passive uptake 3 - 10 μl sample
- Active uptake 10 - 350 μl sample

Assay types and design elements

Versatility is at the base of the handheld concept. The platform can be customized to perform easy sample preparation for an independent downstream assay. Alternatively, a complete multiplexed POC assay, e.g. PCR-based, can be implemented on chip.

All designed elements typically found on *microfluidic Chipshop* devices can be integrated, such as mixing elements, membranes, filters, blisters for liquid storage, lyophilized reagents, detection chambers and secure waste storage. Additionally, we offer different finger pump concepts to enable sample uptake, handling and metering.

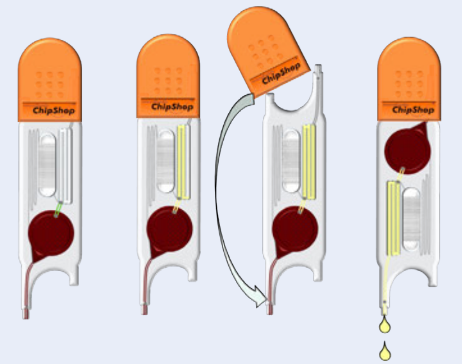


Fig. 946: Example for a sample preparation handheld: whole blood is taken up with unique finger pump cap, followed by membrane-based plasma separation, plasma mixing with pre-deposited dry reagents and sample release through nozzle

Sample readouts

Dependent on implemented assay the handheld platform can be used with or without instrumentation:

Possible instrumentation-independent readout technologies comprise:

- Lateral flow assays
- Precipitation and agglomeration-based readout
- Simple colorimetry

Possible instrumentation-based readout technologies comprise:

- Fluorescence
- Colorimetry
- Electrochemistry
- Special sensor technologies

17.3 Prototyping

At *microfluidic ChipShop* we stock different unstructured standard handheld platforms, which can be used to perform direct mircromilling in house. Direct milling into those thermoplastic polymer substrates is suitable to test design concepts for low amounts of chips. For medium volume prototyping, injection molded handheld devices, based on the standard formats, can be custom-produced with a short turnaround time. The cap of the device can be produced in your CD color and with your company logo.

Please contact us at *inquiries@microfluidic-ChipShop.com* to discuss your custom-specific handheld platform.

Fig. 947: Unstructured handheld platform for prototyping with sample uptake interface

Fig. 948: Unstructured handheld platform for prototyping with sample uptake interface and sample release nozzle - blister positions for liquid storage are already implemented

18 One for all – A universal diagnostic platform

One for all – A partnership with Stratos Product Development for the Bill & Melinda Gates foundation

“One for all” summarizes the question Bill Gates posed in a recent blog: „Can you create a new device that quickly diagnoses HIV, TB, malaria, and other diseases… accepts different samples, like blood, saliva, and sputum… is affordable… and reliable… and will work in a small clinic that has only a few hours of electricity a day?“

18 One for all – A universal diagnostic platform

Delivering a universal point-of-care diagnostic platform allowing for molecular, immunological and clinical chemistry assays in combination with handling of different sample matrices like sputum, plasma, urine etc. is the overall goal of *microfluidic ChipShop's* ChipGenie® edition Dx series.

One of the trigger for this platform was the PanDx project carried out for the Bill & Melinda Gates Foundation.

18.1 One for all – A partnership with Stratos Product Development for the Bill & Melinda Gates foundation

Lab-on-a-Chip solutions – Enabling elements for a complete diagnostics platform for health centers in the developing world

A universal diagnostic platform for all different kinds of bioanalytical assays coping with all relevant samples in human diagnostic was the overall goal of the PanDx project.

Within the Grand Challenges in the Global Health initiative of the Bill & Melinda Gates Foundation, Stratos Product Development took care of the development of the instrument platform and partnered with *microfluidic ChipShop* for the lab-on-a-chip and assay development.

Within an 18-month time frame making massive use of *microfluidic ChipShop's* microfluidic toolbox concept to speed up assay development, a fully working breadboard instrument capable of all three assay types was realized by Stratos, complemented by *microfluidic ChipShop's* work delivering three fully integrated cartridges combined with the development and implementation of three different assay types on chip, namely:

1. A tuberculosis assay working on the molecular level.
2. An HIV p24 antigen immunoassay for the early detection of an infection.
3. A clinical chemistry assay for analyzing the liver function through a colorimetric read-out of the ALT level.

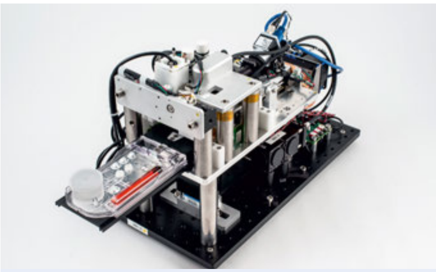


Fig. 949: Stratos breadboard unit – operating molecular, immunological and clinical chemistry assays

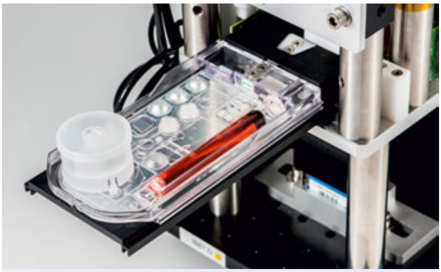
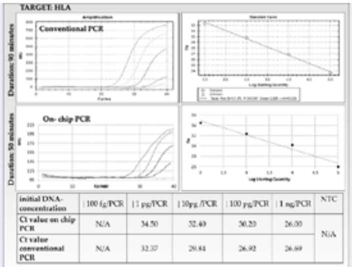


Fig. 950: *microfluidic ChipShop's* tuberculosis cartridge placed in the chip loader

Fig. 951: Cartridges for the detection of tuberculosis, early HIV infection, and liver function (from left to right)



initial DNA-concentration	100 fg/PCR	1 pg/PCR	10pg /PCR	100 pg/PCR	1 ng/PCR	NTC
Ct value on chip PCR	N/A	34.50	32.40	30.20	26.00	N/A
Ct value conventional PCR	N/A	32.37	29.84	26.92	26.69	

Fig. 952: Experimental results of a HLA-real-time PCR performed on chip and in a conventional RT- PCR instrument (Biorad CFX96TM) - Gärtner, Claudia, et al. „Lab-on-a-chip enabled HLA diagnostic: combined sample preparation and real time PCR for HLA-B57 diagnosis." SPIE Sensing Technology+ Applications. International Society for Optics and Photonics, 2015.

microfluidic ChipShop's cartridges are fully equipped with all reagents. The only remaining task for the user is the sample input followed by placement of the cartridge in the Stratos instrument, which takes over the complete assay handling and read-out.

The pictures highlight the three fully working cartridges as well as the breadboard instrument.

Besides the microfluidic chip design and fabrication, *microfluidic ChipShop* covered also the complete assay development making use of its wide service portfolio beyond the microfabrication. The related fabrication tasks include injection molding and assembly, dry and liquid reagent storage and lyophilization, biological reagent formulation, surface tuning, membrane and frit integration, and valve implementation, leading to a fully integrated cartridge as a complete lab-on-a-chip device, demonstrating the potential of the system.

18.2 In continuation – The ChipGenie® edition Dx series – The universal diagnostic platform

The ChipGenie® edition Dx platform is an integrated system covering the detection and identification of biological pathogens in a bleed-to-read fashion. Realized as lab-on-achip system, a consumable cartridge – the lab-on-a-chip – and the respective instrument constitute the ChipGenie® edition Dx system, leaving only the sample introduction as a handson-action to the user.
ChipGenie® edition Dx – Starting point for customization

According to specific needs, the platform will be customized:
The instrument will be equipped with the detection/sensor technology of choice and the chip will be designed for the respective assay panel, target samples and user-scenarios.

Fig. 953: ChipGenie® edition Dx instrument

Fig. 954: ChipGenie® edition Dx cartridge – molecular assay

The consumable – the Lab-on-a-Chip

The assay-specific consumable cartridge defines all system operations. In order to allow for a minimization of hands-on activities and a fully automated processing of all diagnostic assay steps, the consumable is a fully equipped lab: All reagents are integrated on the device either in a dry or liquid form. Sample preparation modules are included and on-board valves and pumps enable a complete operation of the device by the ChipGenie® edition Dx instrument.

Assay categories – Cartridge family

The platform is designed to allow for molecular, immunological, cell-based and clinical chemistry assays. These different assay categories and their varying sample preparation methods and assay steps require dedicated lab-on-a-chip devices. For example, cartridges for immunoassays may include a plasma generation unit, chips for molecular assays a DNA extraction unit or a reverse transcription, whereas cell-based assays can include concentration modules.
An expanding cartridge family will address more and more different diagnostic tasks, being designed according to the design rules of the ChipGenie® edition Dx platform concept in order to be operated with a common instrument platform.

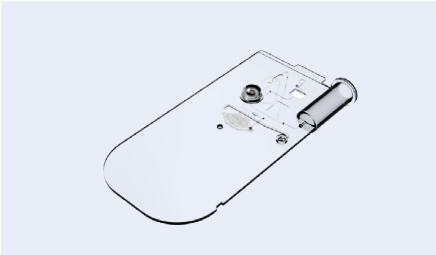
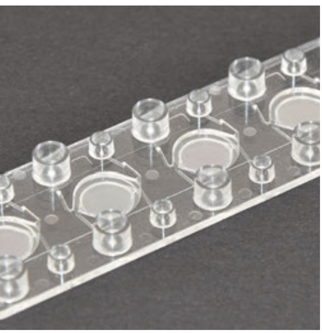
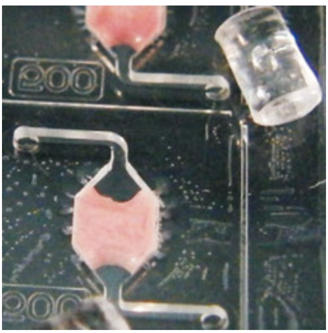


Fig. 955: ChipGenie® Dx cartridge – clinical chemistry assay

Fig. 956: ChipGenie® Dx cartridge – immunoassay

Fig. 957: ChipGenie® Dx cartridge – molecular assay (DNA-based)





19 Finally – Some examples

Examples

Hopefully you were delighted by our *Lab-on-a-Chip Catalogue* and we were either able to serve you with standard microfluidic chips or we could provide you with a roadmap to your custom-made design. Finally, we would like to round up our Lab-on-a-Chip Catalogue with some examples of fluidic chips that might be an inspiration to you and also provide a good impression of our technological capabilities.

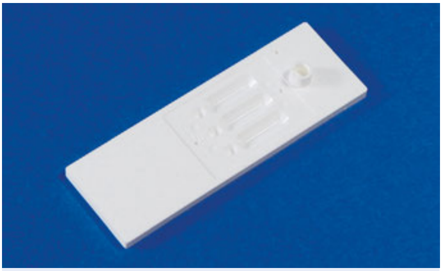


Fig. 958: Diagnostic platform with Luer connectors

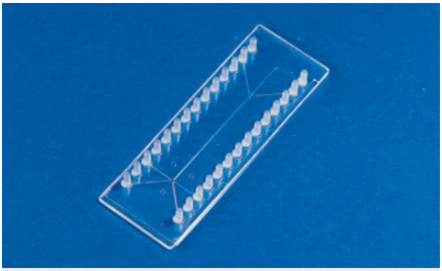


Fig. 959: Cell sorting chip

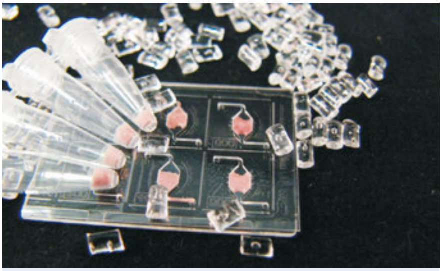


Fig. 960: PCR chip with integrated freeze-dried master mix

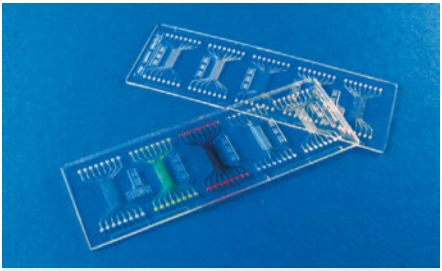


Fig. 961: Channel-array chip

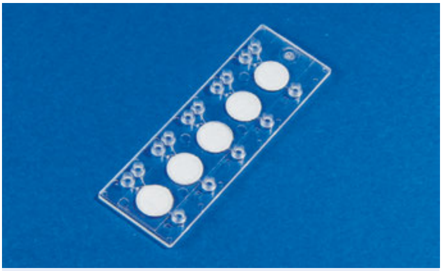


Fig. 962: Hybrid chip consisting of polymer and filters for plasma generation

Fig. 963: Continuous-flow PCR chip, chip, realized within the BMBF-Project "ChipFlussPCR", FKZ 13N9556

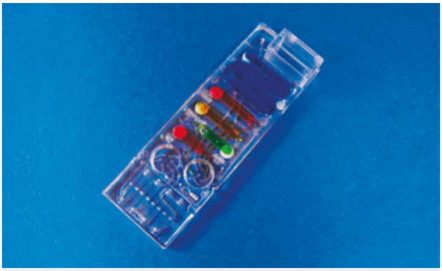


Fig. 964: Hybrid chip for immunoassays with electrochemical detection, realized within the EU-FP6 project "SmartHEALTH", No. 016817

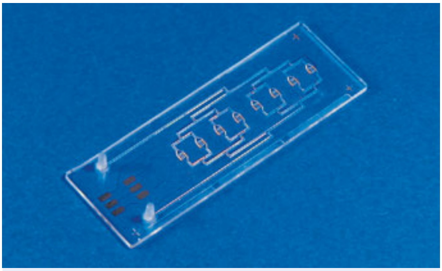


Fig. 965: Cell culture chips with integrated thin film electrodes, realized within the BMBF-Project "HepaChip", FKZ 01GG0728

Fig. 966: Hybrid chip for immunoassays with plasma generation unit for electrochemical detection, realized within EU-FP6 project "SmartHEALTH", No. 016817

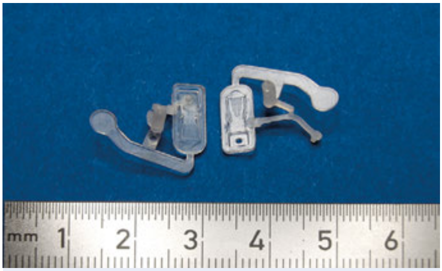


Fig. 967: Two component microinjection molding – Device for agglutionation based assays, realized within the BMBF project FASAMOS, FKZ 02PC2001

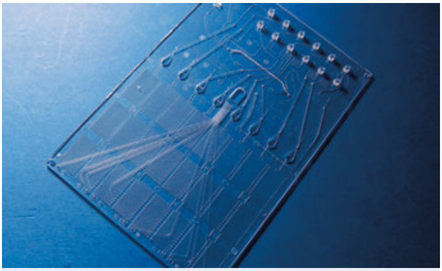


Fig. 968: Sample-in-result-out DNA-analysis chip, realized within the BMBF project ChipFlussPCR, FKZ 13N9556

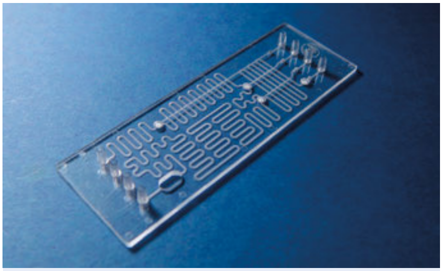


Fig. 969: Microfluidic chip for a complete SELEX-cycle, realized within the ETB project Artamis, FKZ 03139428

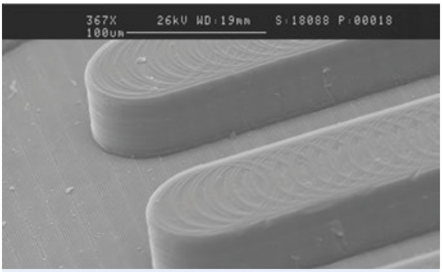


Fig. 970: Microchannel with nanostructured channel floor. The nanostructures have a 1.2 μm period and 200 nm height

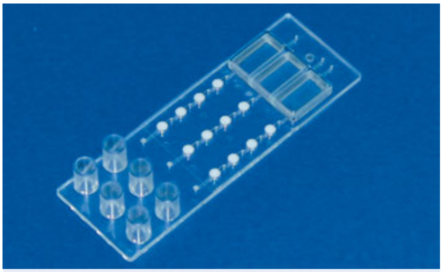


Fig. 971: Microfluidic chip for immunoassay applications with reagent reservoirs and antibody-coated frits for three assays, realized within the BMBF project IFSA, FKZ 16SV5417

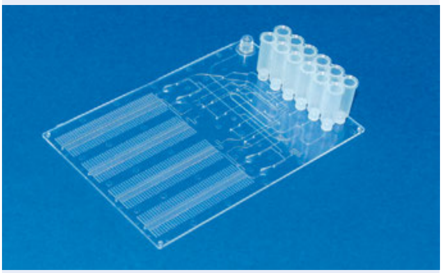


Fig. 972: Sample-in-result-out DNA-analysis chip with hybridisation zone for optoelectronic read-out, realized within the project PatholD Chip, A-102-RT-GC

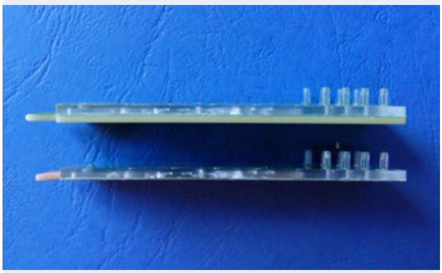


Fig. 973: Microfluidic chip coupled to conventional (top) and flex (bottom) PCBs, realized within the BMBF-project "SafeIS", FKZ 0315574C

Fig. 974: Filtration chip with liquid reservoir

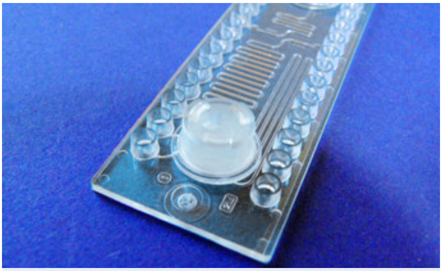


Fig. 975: Fluidic chip with rotary valve

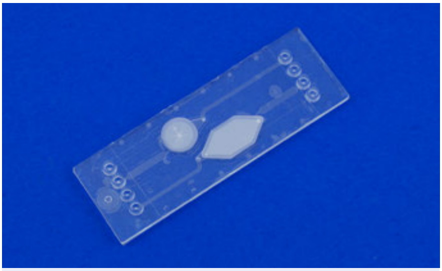


Fig. 976: Plasma generation chip, BMBF project Hämatoram, FKZ 13GW0112B

Fig. 977: Immunoassay chip with plasma generation unit and blister pouches

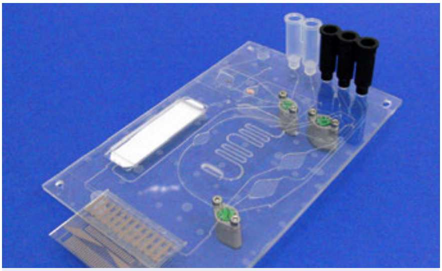


Fig. 978: HLA typing chip for the detection of coeliac disease, realized within the FP 7 project "CD-Medics", No. 216031

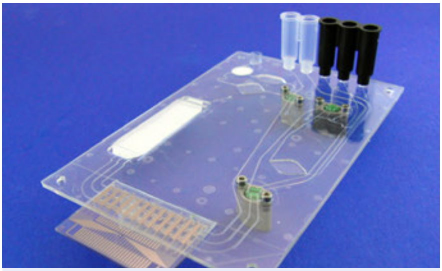


Fig. 979: Serology test chip for the detection of coeliac disease, realized within the FP 7 project "CD-Medics", No.216031

Fig. 980: Boyle-Mariotte PCR chip for ultrafast PCR, design: IMM, realized within the FP 7 project "CD-Medics", No. 216031

Fig. 981: Enyzme-assay development chip, realized within the FP 7 project Multisense Chip, No. 261810

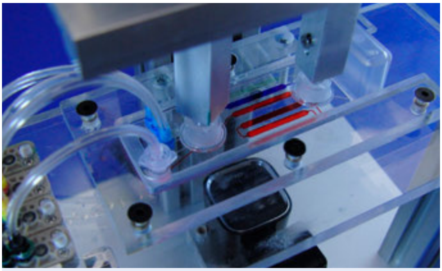


Fig. 982: Enzyme-assay development chip in bread board instrument, realized within FP 7 project Multisense Chip, No. 261810

Fig. 983: Microfluidic chip with lateral flow strip based detection and implemented blister for liquid storage

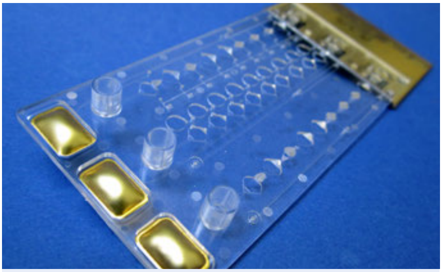


Fig. 984: PCR cartridge with TMR-sensor-based read-out, BMBF projekct MiniLab, No. 16SV4029

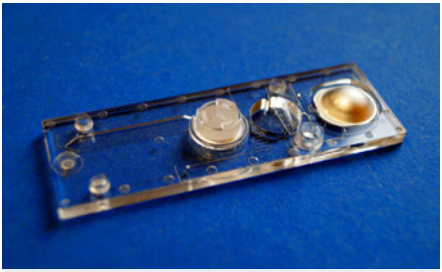


Fig. 985: Particle counting chip with integrated turning valve and staining solution, TAB project No. 2009 FE 0134

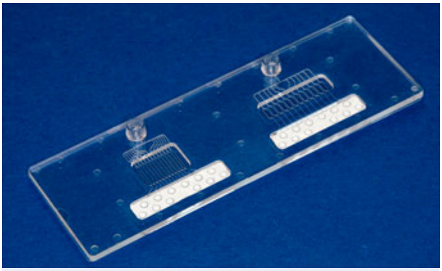


Fig. 986: Parallel PCR chip, FP 7 project Multisense Chip, No. 261810

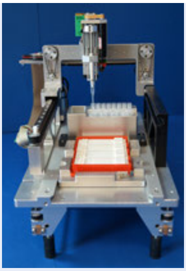


Fig. 987: Merger of standard liquid handling and lab-on-a-chip technology – LOC pipettor & xy-stage for optical read out, TAB project No. 2011 FE 9023

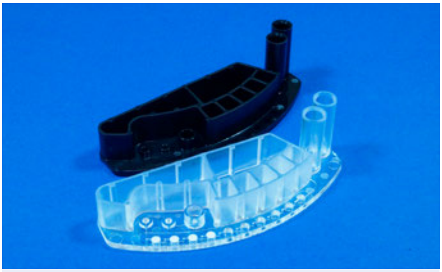


Fig. 988: Chip cuvette for frit-based immunoassays, realized within the BMBF project IFSA, FKZ 16SV5417

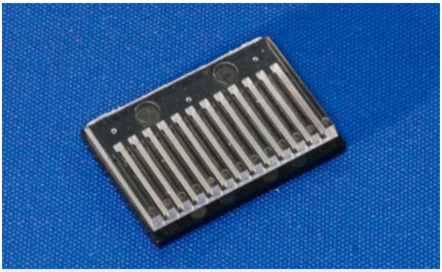


Fig. 989: Microfluidic chip realized for CARE-MAN - Health-CARE by biosensor Measurement and Networking, FP 6, NMP4-CT-2006-017333

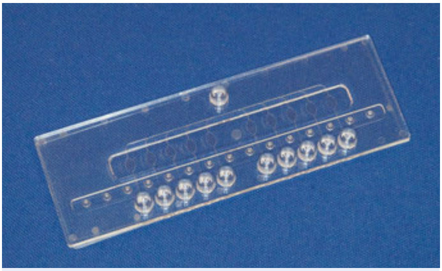


Fig. 990: One sample – 10 reactions: 0.5 µl volume PCR chip, FP 7 project Multisense Chip, No. 261810

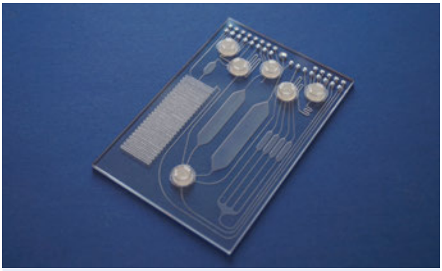


Fig. 991: Integrated microfluidic chip for continuous-flow PCR and parallel immunoassay, FP7 project Multisense Chip, No. 261810

Fig. 992: Breadboard system: Electrochemical immunoassay system for air sample analysis, FP7 project Multisense Chip, No. 261810

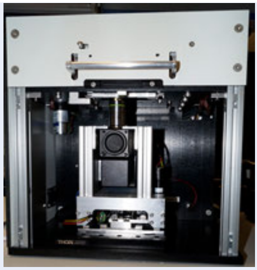


Fig. 993: Breadboard system: Lab-on-a-Chip instrument for optical read-out of immunoassays, TAB project LabChipIO

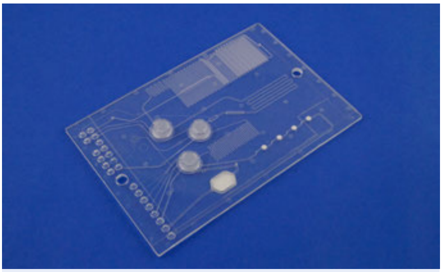


Fig. 994: Integrated microfluidic chip for the detection of bacterial pathogen on molecular and immunological level, FP7 project Multisense Chip, No. 261810

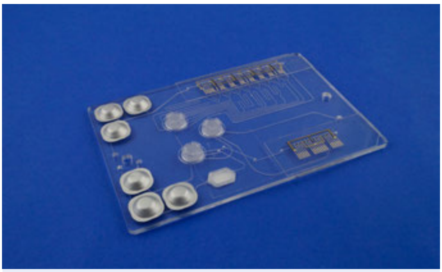


Fig. 995: Integrated microfluidic chip for the detection of bacterial pathogen on molecular and immunological level with integrated electrodes, FP7 project Multisense Chip, No. 261810

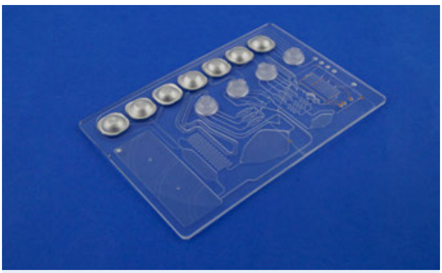


Fig. 996: Integrated microfluidic chip with complete sample preparation for miRNA analysis, BMBF project IMRA, FKZ 0316078A

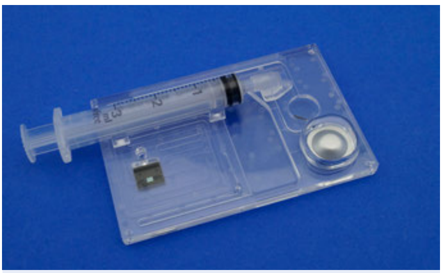


Fig. 997: Selective cell counting chip for hematology, BMBF project MrCyte, FKZ 13N12018

Fig. 998: Miniaturized spectrometer module, ChipGenie Optic TAB project 2013 FE 9021

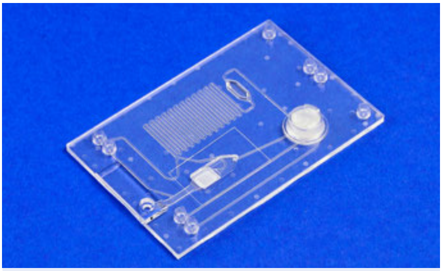


Fig. 999: Cartridge for CTC isolation and lysis. Realized within the EU-FP7 project „CanDo", project number: 610472

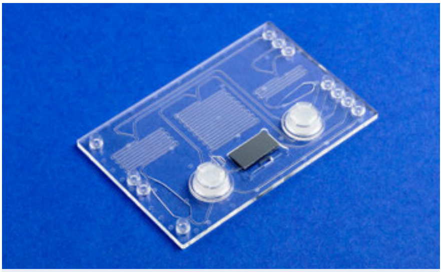


Fig. 1000: Integrated cartridge for DNA amplification and subsequent detection using a silicone photonic sensor. Realized within the EU-FP7 project „CanDo", project number: 610472

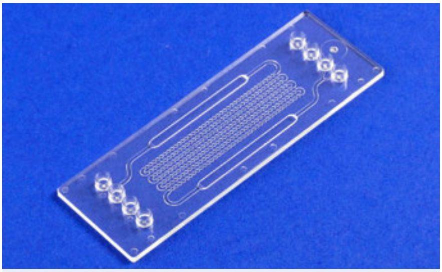


Fig. 1001: Pearl chain mixer module. Realized within the EU-FP7 project „Nanodem", Grant Agreement number: 318372

Fig. 1002: Integrated microfluidic chip for the detection of bacterial pathogens, FP7 project Multisense Chip, No. 261810

Fig. 1003: Multisense Chip Analyzer: Demonstration of detection of airborne bacterial pathogens, FP7 project Multisense Chip, No. 261810

Fig. 1004: Integrated microfluidic chip for the detection of viral pathogens in the food supply chain, FP7 project EDEN, No. 313077

Fig. 1005: Analyzer for molecular detection of viral pathogens in the food supply chain, FP7 project EDEN, No. 313077

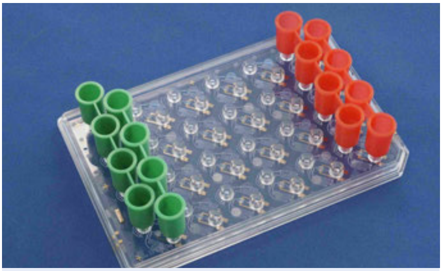


Fig. 1006: Organ-on-chip device operated with hydrostatic fluid management, BMBF project HepaChip, FKZ 031A121D

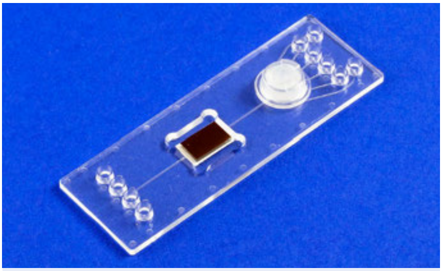


Fig. 1007: Flow cell chip for sensor integration Realized within the BMBF project "Plasmosens", FKZ: 13N13734

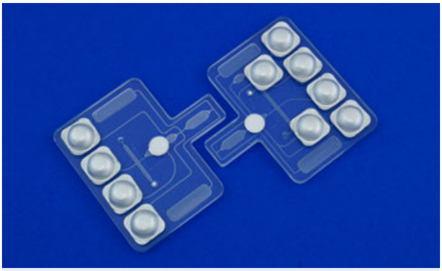


Fig. 1008: Immunoassay-Chip, BMBF-Project HandyLoC, FKZ 13N13714

Fig. 1009: Immunoassay-Chip for mycotoxine analysis, BMBF-Project Kombispec, FKZ 13N13757

Fig. 1010: Real-time PCR chip for B-agent detection, Horizon 2020 project, No. 700264

Fig. 1011: Photonic biosensing chip for microRNA-based early diagnosis of diseases - Fluidic 866 Horizon 2020 project, Grant agreement no: 644242

Fig. 1012: Transwell membrane chip Fluidic 219 with tank Fluidic 234 as fluid reservoir, TAB project number 2013 FE 9021

Fig. 1013: Transwell membrane chip Fluidic 219 with tank Fluidic 235 as fluid reservoir, TAB project number 2013 FE 9021

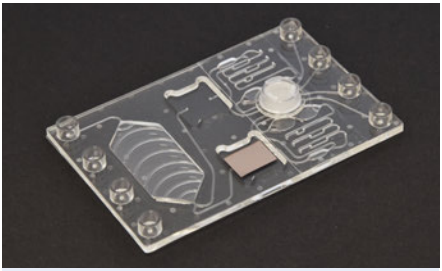


Fig. 1014: Multifunctional sensor platform, BMBF Project Plasmosens, FKZ 13N13734

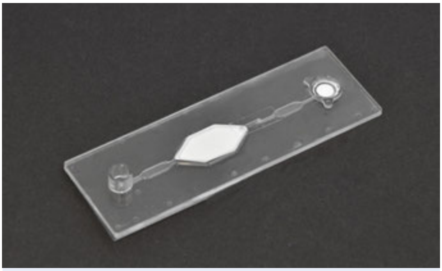


Fig. 1015: Plasma generation chip, BMBF project Hämatoram, FKZ 13GW0112B

Fig. 1016: Cartridge for CBRNe detection Horizon 2020 project ROCSAFE, Grant agreement no: 700264

Fig. 1017: Device for CBRNe detection - field study, Horizon 2020 project ROCSAFE, Grant agreement no: 700264

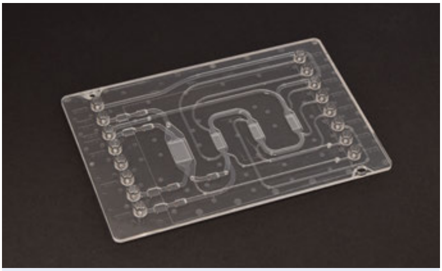


Fig. 1018: Organ-on-a-Chip for complex co-culture experiments, BMBF-Project micro-iPS-Profiler, FKZ 01EK1612A

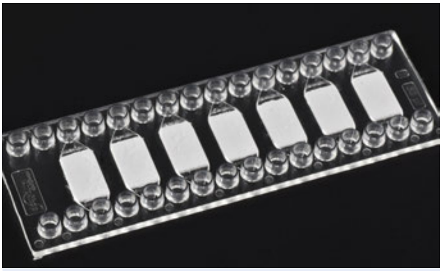


Fig. 1019: Membrane for nucleic acid isolation within a chamber chip

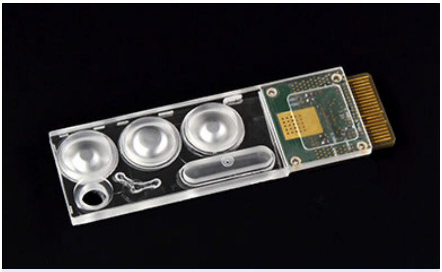


Fig. 1020: Cartridge with integrated sensor for Europium detection, TAB project “SensInt“, FKZ: 2021 FE 9071

Fig. 1021: Lab-on-a-chip analysis system for the detection and resistance determination of Acinetobacter baumannii, BMBF project “OutbreakChecker“, FKZ: 13GW0329B

Fig. 1022: Plasmid-based antibiotic resistance monitoring cartridge, TAB project “Plasmid“, FKZ: 2018 FE 9040

20 Literature

20 Publications

20.1 microfluidic ChipShop's publications - List of selected publications from recent years
20.1.1 Journal and book publications

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