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 integrated 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. 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

Contents

Contents

Contents

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

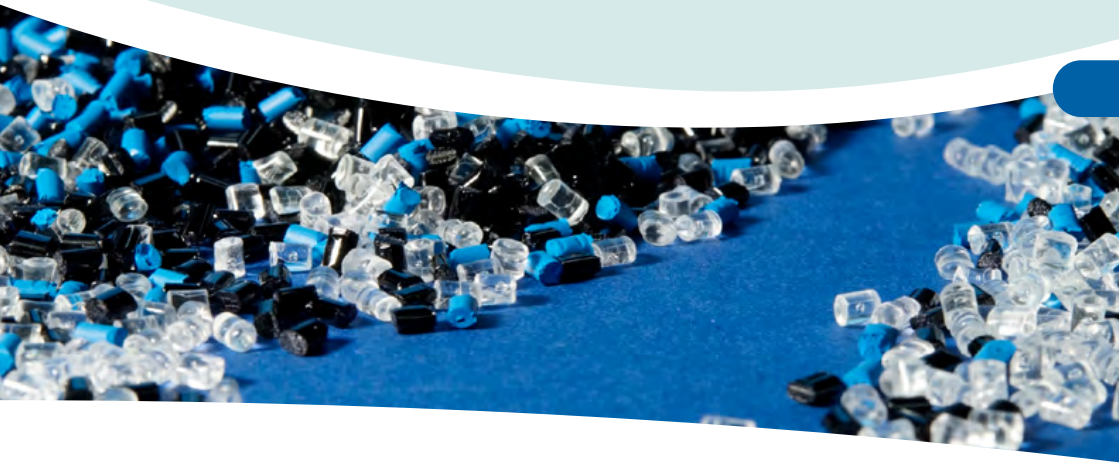
Our mission at *microfluidic ChipShop* is to shrink the biological and chemical laboratory and to bring lab-on-a-chip systems into daily laboratory life.

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 requirements.

Whether you need a single chip or thousands, on 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 create 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 we offer a large choice of different materials, ranging from a wide variety of polymers, via glass or silicon, to ceramics or metals. All materials have their pros and cons, regarding cost or geometrical freedom, for example, polymers are dominating. This chapter guides you through your material choice. Off-the shelf devices are at hand in polymers and in glass, but we also offer custom-designs 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, which was 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 we have to choose the technology for the micro-structuring accordingly. An overview of the different technologies that can be 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 the pros and cons of glass versus polymers.

Table 2: Characteristics of glass and polymers

Optics	Standard thermoplastics	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 polishing 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 assembling process of a non-glass-component
Direct integration of e.g. reservoirs	• Easy – directly in the injection molded part	• Limited. Large structures cannot be integrated as glass part due to cost issues.

Additional functionalities	Standard thermoplastics	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 Euro / 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 need to be used.

If bioreagents need to 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 microfluidics 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 which are frequently used in life sciences.

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

Material	Grades	Description
PMMA – Polymethylmetacrylate	mcs-PMMA-08 • Tg: 110°C mcs-foil-013 • 175 µm thickness • Tg: 110°C	**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:	Cannot be used with:
• Aqueous solutions including diluted acids and bases • Aldehydes • Amines • Oils, fats	• Concentrated acids and bases • Alcohols • Esters • Ketones • Aromatics • Halogenated hydrocarbons

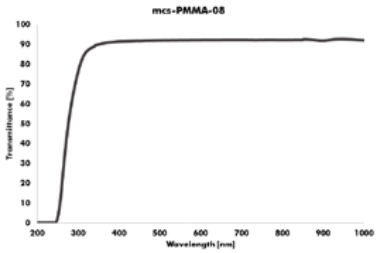


Fig. 1: Transmission spectrum of 1.5 mm thick microscopy slide of mcs-PMMA-08

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

Material	Grades	Description
PC – Polycarbonate	mcs-PC-13 • Tg: 145°C mcs-foil-042 • Tg: 145°C	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:	Cannot be used with:
• Diluted acids • Oils, fats • Alcohols	• Bases • Halogenated hydrocarbons • Esters • Ketones, Aldehydes • Amines • Aromatics

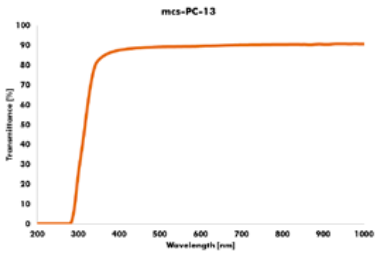


Fig. 2: Transmission spectrum of 1.0 mm thick microscopy slide of mcs-PC-13

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

Material	Grades	Description
mcs-PS-17	mcs-PS-17 • Tg = 100°C mcs-foil-095 • 125 µm thickness • Tg: 100°C	**PS** is a thermoplastic polymer. Polystyrene (PS) is an aromatic polymer made from the monomer styrene., which can be rigid or foamed. The general-purpose polystyrene is clear, hard and brittle. It is a very inexpensive resin per unit weight and has a rather poor barrier to oxygen and water vapor and a relatively low melting point. PS is one of the standard materials conventionally used in the life sciences, partially due to is relatively low price. Microtiter plates are usually made from PS.

Chemical Resistance:

Can be used with:	Cannot be used with:
• Bases • Butyl alcohol, ethylene glycol • Isopropanol (at room temperature) • 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 (except mineral oil)

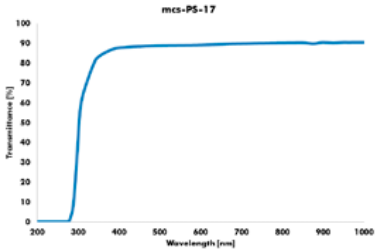


Fig. 3: Transmission spectrum of 1.0 mm thick microscopy slide of mcs-PS-17

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

Material	Grades	Description
Topas (COC)	mcs-COC-13 • Tg: 142°C mcs-foil-011 • 140 µm thickness • Tg: 70°C mcs-foil-080 • 125 µm thickness • Tg: 142°C	**Topas** is thermoplastic polymer. It is a cyclo-olefin copolymer (COC) and completely nonpolar and amorphous. COC has a very low permeability for water vapour and a low capacity for the absorption of water. The current drawback of this material is that available foil material has a T_g around 70°C.

Chemical Resistance:

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

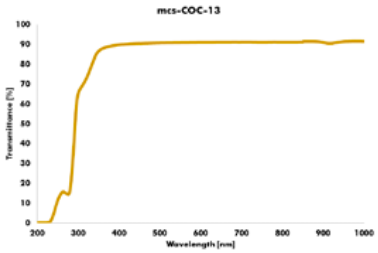


Fig. 4: Transmission spectrum of 1.0 mm thick microscopy slide of mcs-COC-13

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

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

Chemical Resistance:

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

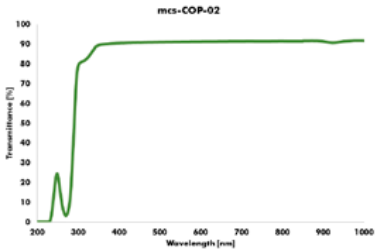


Fig. 5: Transmission spectrum of 1.0 mm thick microscopy slide of mcs-COP-02

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

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

Chemical Resistance:

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

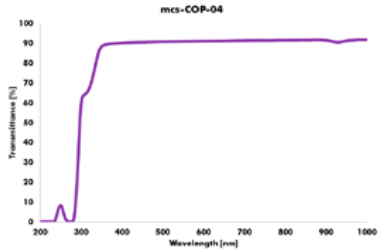


Fig. 6: Transmission spectrum of 1.0 mm thick microscopy slide of mcs-COP-04

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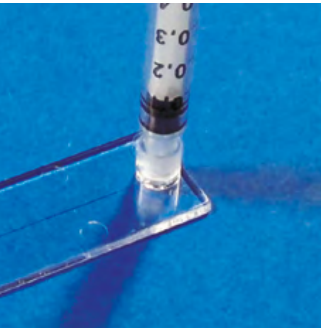
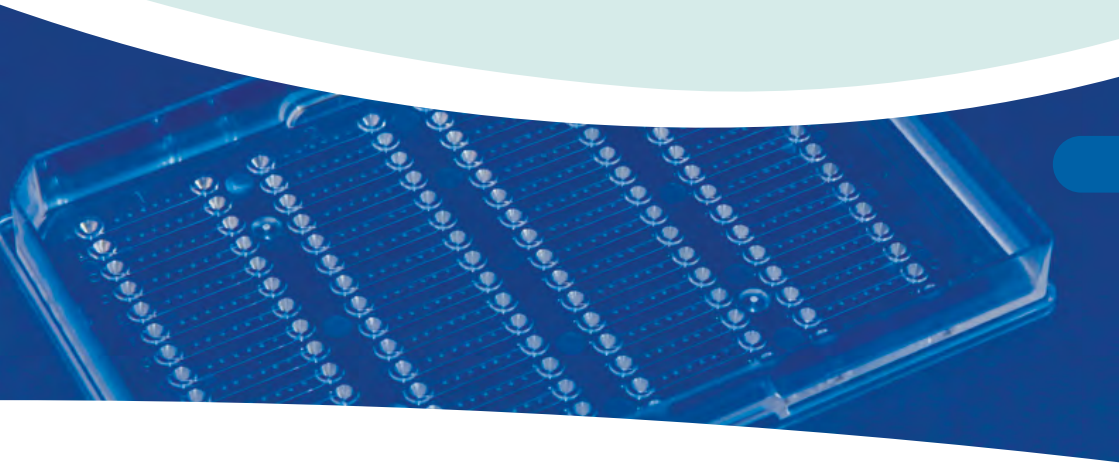


3 Microfluidic chips – Polymers



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. All chips can be easily to used with a pipette or the fluidic interfaces and support kits offered as accessories in Chapter 8.

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 interconnects on the top and the microfludic 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 descriptions.

3.1 Straight channel chips – Microscopy slide format

On the format of a microscopy 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 (see Chapter 8, fluidic interfaces). Alternatively, standard Luer interfaces are convenient as are olives integrated on the chip to be directly connected with silicone tubings, for example.

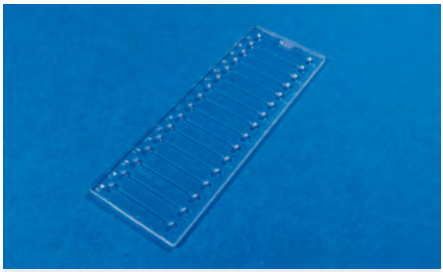


Fig. 7: Microfluidic chip – 16-channel through-hole chip family

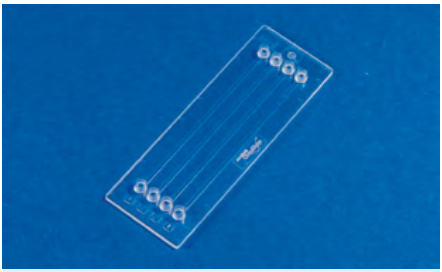


Fig. 8: Microfluidic chip – 4-channel Mini Luer chip family

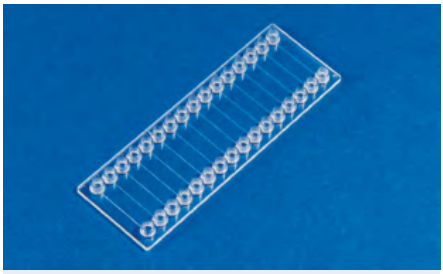


Fig. 9: Microfluidic chip – 16-channel Mini Luer chip family

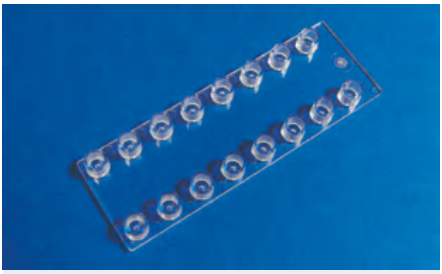


Fig. 10: Microfluidic chip – 8-channel Luer chip family

3.1.1 Straight channel chips – Fluidic interface: Through-holes

3.1.1.1 Straight channel chips – Fluidic interface: Through-holes – Four parallel channels

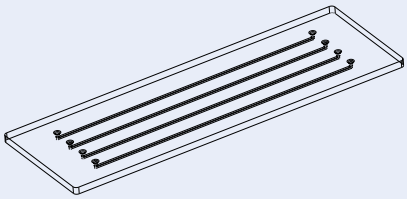


Fig. 11: Schematic drawing of the four-channel through-hole chip family

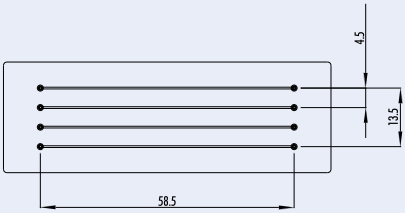


Fig. 12: Details of the four-channel through-hole chip family

Product Code	Channel Width [µm]	Channel Depth [µm]	Channel Length [mm]	Cover Lid Thickness [µm]	Material	Price [€/chip] 1+	10+	30+
01-0152-0143-01	20	20	58.5	175	PMMA	42.50	31.20	23.50
01-0153-0143-02	20	20	58.5	140	Topas	42.50	31.20	23.50
01-0154-0145-01	50	50	58.5	175	PMMA	42.50	31.20	23.50
01-0155-0145-02	50	50	58.5	140	Topas	42.50	31.20	23.50
01-0156-0144-01	100	100	58.5	175	PMMA	42.50	31.20	23.50
01-0157-0144-02	100	100	58.5	140	Topas	42.50	31.20	23.50
01-0158-0156-01	200	200	58.5	175	PMMA	36.20	24.30	18.10
01-0159-0156-02	200	200	58.5	140	Topas	36.20	24.30	18.10
01-0203-0180-01	800	20	58.5	175	PMMA	36.20	24.30	18.10
01-0204-0180-02	800	20	58.5	140	Topas	36.20	24.30	18.10
01-0160-0138-01	1,000	200	58.5	175	PMMA	36.20	24.30	18.10
01-0161-0138-02	1,000	200	58.5	140	Topas	36.20	24.30	18.10

3.1.1.2 Straight channel chips – Fluidic interface: Through-holes – 16 parallel channels

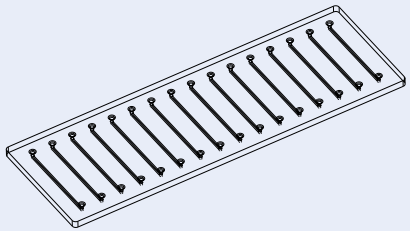


Fig. 13: Schematic drawing of the 16-channel through-hole chip family

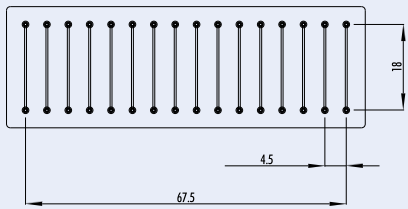


Fig. 14: Details of the 16-channel through-hole chip family

Product Code	Channel Width [µm]	Channel Depth [µm]	Channel Length [mm]	Cover Lid Thickness [µm]	Material	Price [€/chip] 1+	10+	30+
01-0162-0142-01	200	100	18.0	175	PMMA	36.20	24.30	18.10
01-0163-0142-02	200	100	18.0	140	Topas	36.20	24.30	18.10
01-0164-0152-01	1,000	200	18.0	175	PMMA	36.20	24.30	18.10
01-0165-0152-02	1,000	200	18.0	140	Topas	36.20	24.30	18.10

3.1.2 Straight channel chips – Fluidic interface: Olives
3.1.2.1 Straight channel chips – Fluidic interface: Olives – 4-parallel channels

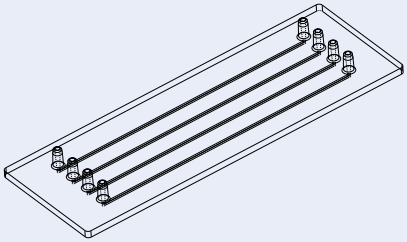


Fig. 15: Schematic drawing of the 4-channel olive chip family

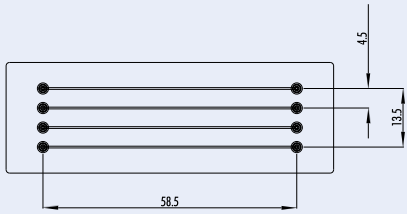


Fig. 16: Details of the 4-channel olive chip family

Product Code	Channel Width [µm]	Channel Depth [µm]	Channel Length [mm]	Cover Lid Thickness [µm]	Material	Price [€/chip] 1+	10+	30+
01-0182-0143-01	20	20	58.5	175	PMMA	42.50	31.20	23.50
01-0183-0143-02	20	20	58.5	140	Topas	42.50	31.20	23.50
01-0184-0145-01	50	50	58.5	175	PMMA	42.50	31.20	23.50
01-0185-0145-02	50	50	58.5	140	Topas	42.50	31.20	23.50
01-0186-0144-01	100	100	58.5	175	PMMA	42.50	31.20	23.50
01-0187-0144-02	100	100	58.5	140	Topas	42.50	31.20	23.50
01-0188-0156-01	200	200	58.5	175	PMMA	36.20	24.30	18.10
01-0189-0156-02	200	200	58.5	140	Topas	36.20	24.30	18.10
01-0205-0180-01	800	20	58.5	175	PMMA	36.20	24.30	18.10
01-0206-0180-02	800	20	58.5	140	Topas	36.20	24.30	18.10
01-0190-0138-01	1,000	200	58.5	175	PMMA	36.20	24.30	18.10
01-0191-0138-02	1,000	200	58.5	140	Topas	36.20	24.30	18.10

3.1.2.2 Straight channel chips – Fluidic interface: Olives – 16 parallel channels

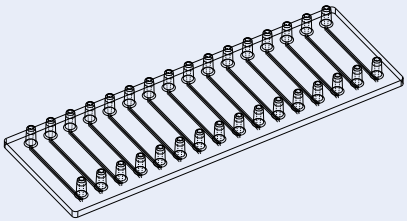


Fig. 17: Schematic drawing of the 16-channel olive chip family

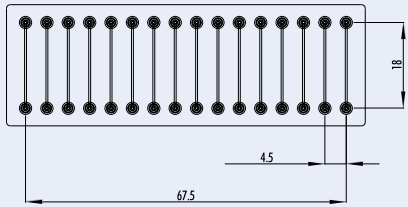


Fig. 18: Details of the 16-channel olive chip family

Product Code	Channel Width [µm]	Channel Depth [µm]	Channel Length [mm]	Cover Lid Thickness [µm]	Material	Price [€/chip] 1+	10+	30+
01-0192-0142-01	200	100	18.0	175	PMMA	36.20	24.30	18.10
01-0193-0142-02	200	100	18.0	140	Topas	36.20	24.30	18.10
01-0194-0152-01	1,000	200	18.0	175	PMMA	36.20	24.30	18.10
01-0195-0152-02	1,000	200	18.0	140	Topas	36.20	24.30	18.10

3.1.3 Straight channel chips – Fluidic interface: Mini Luer

3.1.3.1 Straight channel chips – Fluidic interface: Mini Luer – Four parallel channels

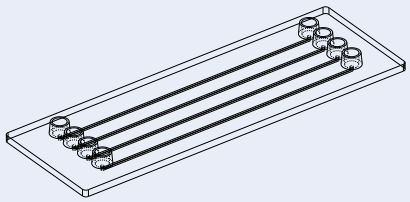


Fig. 19: Schematic drawing of the four-channel Mini Luer chip family

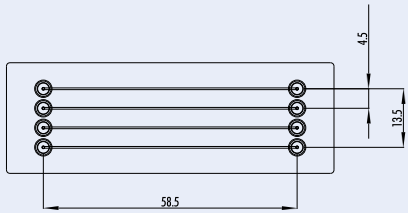


Fig. 20: Details of the four-channel Mini Luer chip family

Product Code	Channel Width [µm]	Channel Depth [µm]	Channel Length [mm]	Cover Lid Thickness [µm]	Material	Price [€/chip] 1+	10+	30+
01-0166-0143-01	20	20	58.5	175	PMMA	42.50	31.20	23.50
01-0167-0143-02	20	20	58.5	140	Topas	42.50	31.20	23.50
01-0168-0145-01	50	50	58.5	175	PMMA	42.50	31.20	23.50
01-0169-0145-02	50	50	58.5	140	Topas	42.50	31.20	23.50
01-0170-0144-01	100	100	58.5	175	PMMA	42.50	31.20	23.50
01-0171-0144-02	100	100	58.5	140	Topas	42.50	31.20	23.50
01-0172-0156-01	200	200	58.5	175	PMMA	36.20	24.30	18.10
01-0173-0156-02	200	200	58.5	140	Topas	36.20	24.30	18.10
01-0207-0180-01	800	20	58.5	175	PMMA	36.20	24.30	18.10
01-0208-0180-02	800	20	58.5	140	Topas	36.20	24.30	18.10
01-0174-0138-01	1,000	200	58.5	175	PMMA	36.20	24.30	18.10
01-0175-0138-02	1,000	200	58.5	140	Topas	36.20	24.30	18.10

3.1.3.2 Straight channel chips – Fluidic interface: Mini Luer – 16 parallel channels

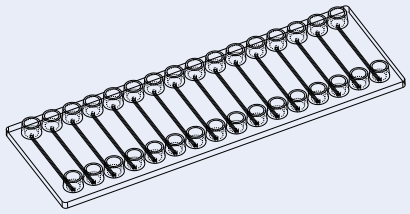


Fig. 21: Schematic drawing of the 16-channel Mini Luer chip family

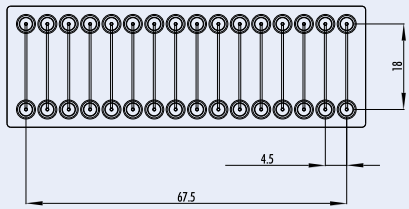


Fig. 22: Details of the 16-channel Mini Luer chip family

Product Code	Channel Width [µm]	Channel Depth [µm]	Channel Length [mm]	Cover Lid Thickness [µm]	Material	Price [€/chip] 1+	10+	30+
01-0176-0142-01	200	100	18.0	175	PMMA	36.20	24.30	18.10
01-0177-0142-02	200	100	18.0	140	Topas	36.20	24.30	18.10
01-0178-0152-01	1,000	200	18.0	175	PMMA	36.20	24.30	18.10
01-0179-0152-02	1,000	200	18.0	140	Topas	36.20	24.30	18.10

3.1.4 Straight channel chips – Fluidic interface: Luer
3.1.4.1 Straight channel chips – Fluidic interface: Luer – Eight parallel channels

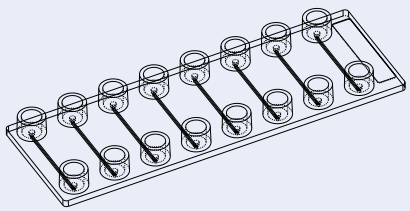


Fig. 23: Schematic drawing of the eight-channel Luer chip family

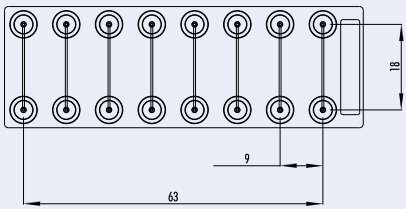


Fig. 24: Details of the eight-channel Luer chip family

Product Code	Channel Width [µm]	Channel Depth [µm]	Channel Length [mm]	Cover Lid Thickness [µm]	Material	Price [€/chip] 1+	10+	30+
01-0180-0157-01	100	100	18.0	175	PMMA	42.50	31.20	23.50
01-0181-0157-02	100	100	18.0	140	Topas	42.50	31.20	23.50
01-0190-0431-01	2,910	100	18.0	175	PMMA	42.50	31.20	23.50
01-0191-0431-05	2,910	100	18.0	188	Zeonor	42.50	31.20	23.50

3.1.4.2 Straight channel chips – Fluidic interface: Luer – One channel

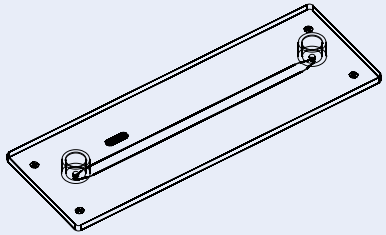


Fig. 25: Schematic drawing of the one channel chip with Luer interface

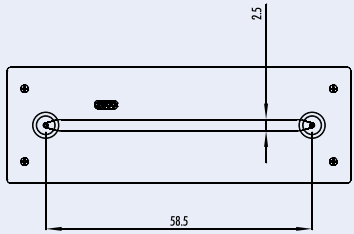


Fig. 26: Details of the one channel chip with Luer interface

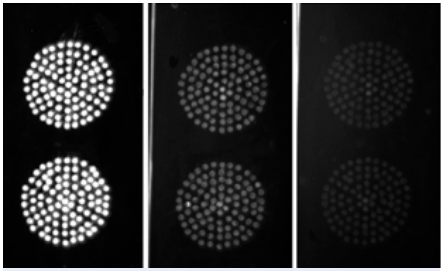


Fig. 27: Spotted fluorescent probes (spot diameter 80 µm) in channel of one channel Luer chip. Concentrations (left to right) 100 ng/µl, 10 ng/µl, 1 ng/µl

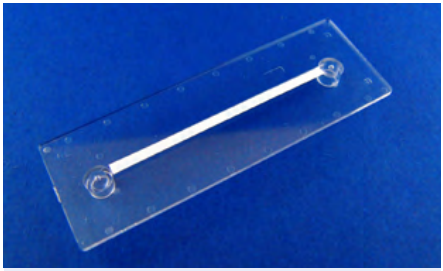


Fig. 28: One channel Luer chip with inserted lateral flow strip and spotted probes

Product Code	Channel Width [µm]	Channel Depth [µm]	Channel Length [mm]	Lid Thickness [µm]	Material	Surface treatment	Price [€/chip] 1+	Price [€/chip] 10+	Price [€/chip] 100+
01-0182-0268-01	2,500	150	58.5	175	PMMA	-	36.20	24.30	18.10
01-0183-0268-05	2,500	150	58.5	188	Zeonor	-	36.20	24.30	18.10
01-0184-0268-01	2,500	150	58.5	175	PMMA	hydrophilized	46.20	29.30	19.98
01-0185-0268-05	2,500	150	58.5	188	Zeonor	hydrophilized	46.20	29.30	19.98

3.2 Straight channel chips – Microtiter-plate format – Fluidic interface: Through-holes

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 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.

3.2.1 Straight channel chips – Microtiter-plate format – 64 channel plate

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.

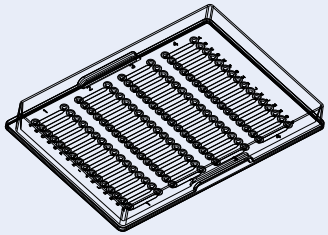


Fig. 29: Schematic drawing of the microfluidic titer plate

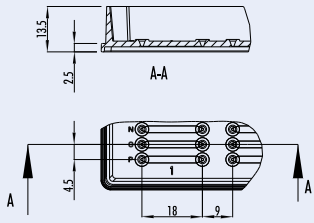


Fig. 30: Details of the microfluidic titer plate

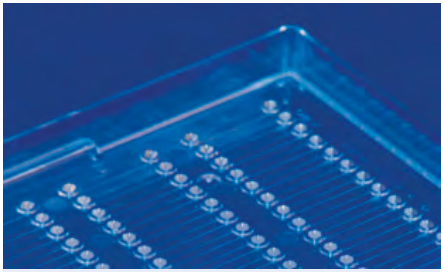


Fig. 31: Microfluidic titer plate

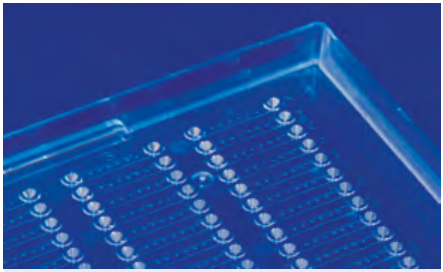


Fig. 32: Microfluidic titer plate with spotted probes

Product Code	Channel Dimensions Width [mm]	Depth [mm]	Length [mm]	Material	Surface Treatment	Price [€/chip] 1+	10+	30+
01-0242-0102-01	2	0.15	18	PMMA	-	79.00	59.00	29.00
01-0243-0102-03	2	0.15	18	PC	-	79.00	59.00	29.00
01-0244-0102-07	2	0.15	18	PS	-	79.00	59.00	29.00
01-0245-0102-05	2	0.15	18	Zeonor	-	79.00	59.00	29.00
01-0246-0102-01	2	0.15	18	PMMA	hydrophilized	98.00	78.00	38.00
01-0247-0102-03	2	0.15	18	PC	hydrophilized	98.00	78.00	38.00
01-0248-0102-07	2	0.15	18	PS	hydrophilized	98.00	78.00	38.00
01-0249-0102-05	2	0.15	18	Zeonor	hydrophilized	98.00	78.00	38.00

3.2.2 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.

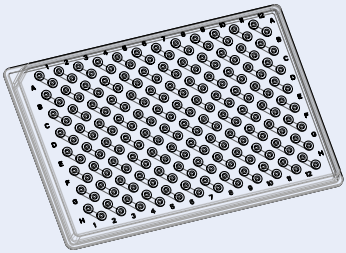


Fig. 33: Schematic drawing of the microfluidic microtiter plate top view – Fluidic 600 – 150 μm channel depth

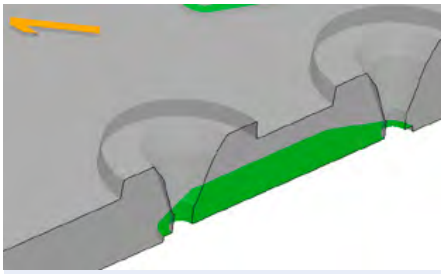


Fig. 34: Detail of the microfluidic microtiter plate with 1.9 μl channel volume – Fluidic 600 – 150 μm channel depth

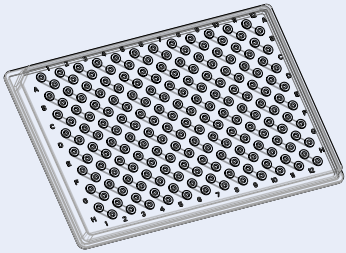


Fig. 35: Schematic drawing of the microfluidic microtiter plate top view – Fluidic 627 – 600 μm channel depth

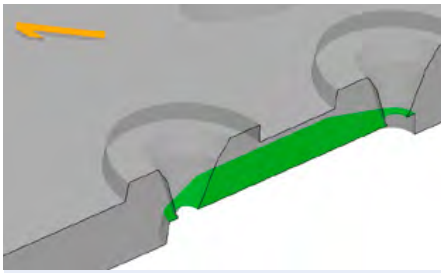


Fig. 36: Detail of the microfluidic microtiter plate with 7.6 μl channel volume – Fluidic 627 – 600 μm channel depth

Product Code	Channel Dimensions Volume [µl]	Width [mm]	Depth [mm]	Length [mm]	Material	Surface Treatment	Price [€/chip] 1+	10+	30+
01-0254-0600-01	1.9	2	0.15	6.364	PMMA	-	79.00	59.00	29.00
01-0255-0600-02	1.9	2	0.15	6.364	Topas	-	79.00	59.00	29.00
01-0256-0600-03	1.9	2	0.15	6.364	PC	-	79.00	59.00	29.00
01-0257-0600-07	1.9	2	0.15	6.364	PS	-	79.00	59.00	29.00
01-0258-0600-01	1.9	2	0.15	6.364	PMMA	hydrophilized	98.00	78.00	38.00
01-0259-0600-02	1.9	2	0.15	6.364	Topas	hydrophilized	98.00	78.00	38.00
01-0260-0600-03	1.9	2	0.15	6.364	PC	hydrophilized	98.00	78.00	38.00
01-0261-0600-07	1.9	2	0.15	6.364	PS	hydrophilized	98.00	78.00	38.00

Product Code	Channel Dimensions Volume [µl]	Width [mm]	Depth [mm]	Length [mm]	Material	Surface Treatment	Price [€/chip] 1+	10+	30+
01-0262-0627-01	7.6	2	0.6	6.364	PMMA	-	79.00	59.00	29.00
01-0263-0627-02	7.6	2	0.6	6.364	Topas	-	79.00	59.00	29.00
01-0264-0627-03	7.6	2	0.6	6.364	PC	-	79.00	59.00	29.00
01-0265-0627-07	7.6	2	0.6	6.364	PS	-	79.00	59.00	29.00
01-0266-0627-01	7.6	2	0.6	6.364	PMMA	hydrophilized	98.00	78.00	38.00
01-0267-0627-02	7.6	2	0.6	6.364	Topas	hydrophilized	98.00	78.00	38.00
01-0268-0627-03	7.6	2	0.6	6.364	PC	hydrophilized	98.00	78.00	38.00
01-0269-0627-07	7.6	2	0.6	6.364	PS	hydrophilized	98.00	78.00	38.00

3.3 Straight channel chips with waste chamber

3.3.1 Straight channel chips with waste chamber – Single channel –Fluidic interface: Luer

This device features a single broad channel with an additional large chamber, for example to allow on-chip waste storage. As fluidic interfaces, female Luer connectors are attached.

For the colored chips, the structured part is dyed and the cover lid is transparent.

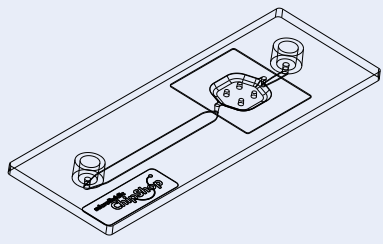


Fig. 37: Schematic drawing of a straight channel chip with additional large chamber

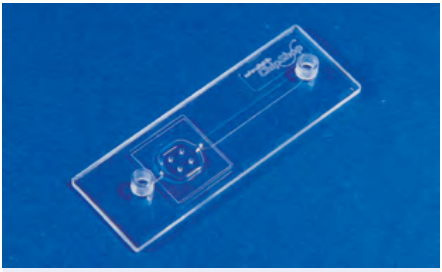


Fig. 38: Straight channel chip – transparent

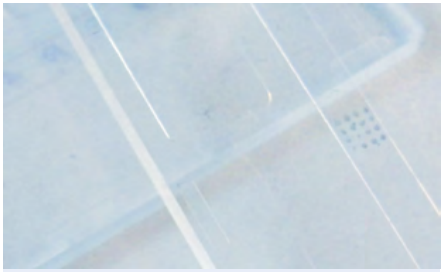


Fig. 39: Straight channel chip – transparent with spotted probes

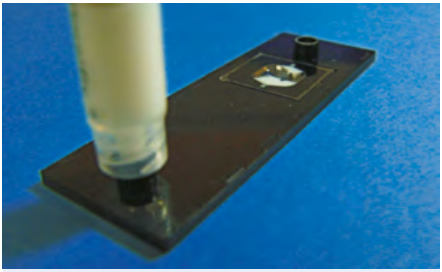


Fig. 40: Straight channel chip – black

Product Code	Channel Width [µm]	Channel Depth [µm]	Channel Length [mm]	Volume chamber [µl]	Material	Price [€/chip] 1+	10+	30+
01-0196-0095-01	3000	200	36.0	75	PMMA	44.50	31.20	23.50
01-0197-0095-02	3000	200	36.0	75	Topas	44.50	31.20	23.50
01-0198-0095-02.1	3000	200	36.0	75	Topas, black	44.50	31.20	23.50
01-0199-0095-03	3000	200	36.0	75	PC	44.50	31.20	23.50
01-0200-0095-03.1	3000	200	36.0	75	PC, black	44.50	31.20	23.50
01-0201-0095-05	3000	200	36.0	75	Zeonor	44.50	31.20	23.50
01-0202-0095-05.1	3000	200	36.0	75	Zeonor, black	44.50	31.20	23.50

3.3.2 Straight channel chips with waste chamber – Double channel – Fludic interface: Mini Luer

In this chip, two large fluidic chambers are implemented at the top of the chip. Four fluidic interfaces for each of these chambers allow not only to apply the sample, but in particular to flow different reagent solutions in the chambers using connected pumps. Large waste reservoirs, allowing for a liquid uptake of roughly 500 µl each, enable to run assays without a need for waste management. A water-tight but air permeable membrane ensures that no contamination will take place through the waste reservoirs.

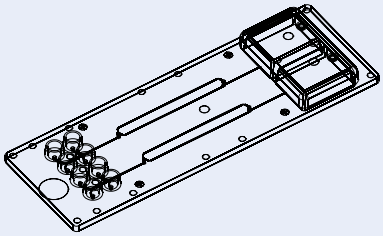


Fig. 41: Schematic drawing of a straight channel chip with waste chamber 272

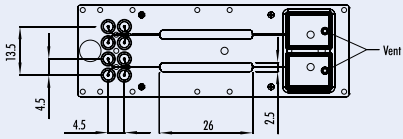


Fig. 42: Details straight channel chip with waste chamber 272

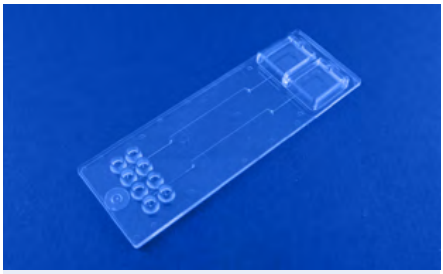


Fig. 43: Straight channel chip 272

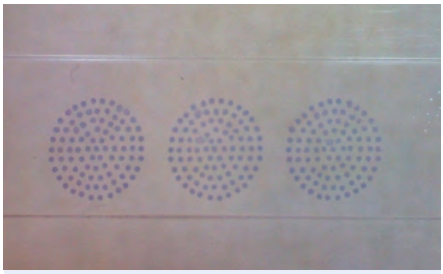


Fig. 44: Spotted probes (diameter 80 µm) in straight channel chip 272

Product Code	Channel Width [µm]	Channel Depth [µm]	Channel Length [mm]	Lid Thickness [µm]	Material	Surface treatment	Price [€/chip] 1+	Price [€/chip] 10+	Price [€/chip] 100+
01-0234-0272-01	2.500	200	26.0	175	PMMA	-	44.50	31.20	23.50
01-0235-0272-02	2.500	200	26.0	140	Topas	-	44.50	31.20	23.50
01-0236-0272-05	2.500	200	26.0	188	Zeonor	-	44.50	31.20	23.50
01-0237-0272-05.1	2.500	200	26.0	188	Zeonor black	-	44.50	31.20	23.50
01-0238-0272-05.2	2.500	200	26.0	188	Zeonor white	-	44.50	31.20	23.50
01-0239-0272-01	2.500	200	26.0	175	PMMA	hydrophilized	55.50	36.20	25.60
01-0240-0272-02	2.500	200	26.0	140	Topas	hydrophilized	55.50	36.20	25.60
01-0241-0272-05	2.500	200	26.0	188	Zeonor	hydrophilized	55.50	36.20	25.60

3.4 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.

3.4.1 Cross-shaped channel chips – Extended size plaform I

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

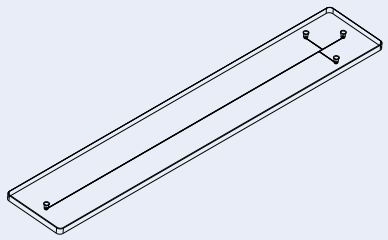


Fig. 45: Schematic drawing of the cross-shaped channel chip

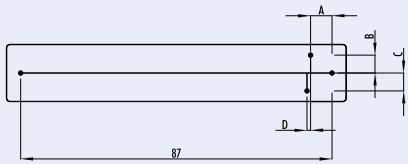


Fig. 46: Details of the cross-shaped channel chips

Product Code	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+
02-0758-0082-01	50	50	87.0	1.0	6.0	5.0	5.0	0	175	PMMA	42.35	31.19	25.18	9.98
02-0759-0082-02	50	50	87.0	1.0	6.0	5.0	5.0	0	140	Topas	42.35	31.19	25.18	9.98
02-0760-0201-01	50	50	87.0	1.0	6.0	5.0	5.0	0.1	175	PMMA	42.35	31.19	25.18	9.98
02-0761-0201-02	50	50	87.0	1.0	6.0	5.0	5.0	0.1	140	Topas	42.35	31.19	25.18	9.98
02-0762-0106-01	75	75	87.0	1.0	6.0	5.0	5.0	0	175	PMMA	42.35	31.19	25.18	9.98
02-0763-0106-02	75	75	87.0	1.0	6.0	5.0	5.0	0	140	Topas	42.35	31.19	25.18	9.98
02-0764-0166-01	100	100	87.0	1.0	6.0	5.0	5.0	0	175	PMMA	42.35	31.19	25.18	9.98
02-0765-0166-02	100	100	87.0	1.0	6.0	5.0	5.0	0	140	Topas	42.35	31.19	25.18	9.98

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

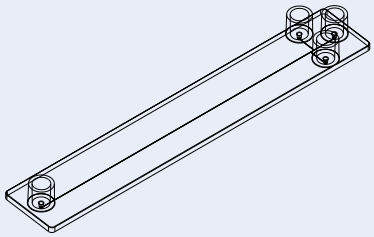


Fig. 47: Schematic drawing of the cross-shaped channel chip

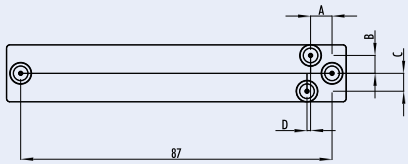


Fig. 48: Details of the cross-shaped channel chips with Luer interfaces

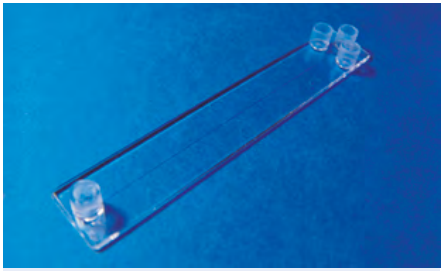


Fig. 49: Cross-shaped channel chip with Luer interfaces

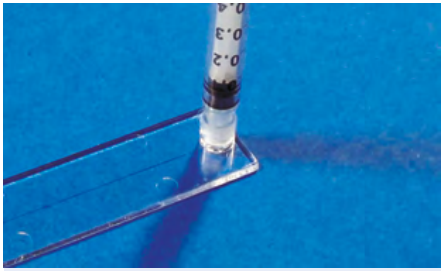


Fig. 50: Cross-shaped channel chip with female Luer interface and a syringe as male counterpart

Product Code	Channel Width	Channel Depth	Channel Length	Hole-Diameter	Geometry A	Geometry B	Geometry C	Geometry D	Lid Thickness	Material	Price [€/chip] 1+	10+	100+	1000+
	[µm]	[µm]	[mm]	[mm]	[mm]				[µm]					
02-0750-0082-01	50	50	87.0	1.0	6.0	5.0	5.0	0	175	PMMA	42.35	31.19	25.18	9.98
02-0751-0082-02	50	50	87.0	1.0	6.0	5.0	5.0	0	140	Topas	42.35	31.19	25.18	9.98
02-0769-0082-05	50	50	87.0	1.0	6.0	5.0	5.0	0	100	Zeonor	42.35	31.19	25.18	9.98
02-0752-0201-01	50	50	87.0	1.0	6.0	5.0	5.0	0.1	175	PMMA	42.35	31.19	25.18	9.98
02-0753-0201-02	50	50	87.0	1.0	6.0	5.0	5.0	0.1	140	Topas	42.35	31.19	25.18	9.98
02-0767-0201-05	50	50	87.0	1.0	6.0	5.0	5.0	0.1	100	Zeonor	42.35	31.19	25.18	9.98
02-0754-0106-01	75	75	87.0	1.0	6.0	5.0	5.0	0	175	PMMA	42.35	31.19	25.18	9.98
02-0755-0106-02	75	75	87.0	1.0	6.0	5.0	5.0	0	140	Topas	42.35	31.19	25.18	9.98
02-0768-0106-05	75	75	87.0	1.0	6.0	5.0	5.0	0	100	Zeonor	42.35	31.19	25.18	9.98
02-0770-0202-01	75	75	87.0	1.0	6.0	5.0	5.0	0.1	175	PMMA	42.35	31.19	25.18	9.98
02-0771-0202-02	75	75	87.0	1.0	6.0	5.0	5.0	0.1	140	Topas	42.35	31.19	25.18	9.98
02-0772-0202-05	75	75	87.0	1.0	6.0	5.0	5.0	0.1	100	Zeonor	42.35	31.19	25.18	9.98
02-0756-0166-01	100	100	87.0	1.0	6.0	5.0	5.0	0	175	PMMA	42.35	31.19	25.18	9.98
02-0757-0166-02	100	100	87.0	1.0	6.0	5.0	5.0	0	140	Topas	42.35	31.19	25.18	9.98
02-0766-0166-05	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	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+
02-0773-0394-01	200	200	87.0	1.0	6.0	5.0	5.0	0	175	PMMA	42.35	31.19	25.18	9.98
02-0774-0394-02	200	200	87.0	1.0	6.0	5.0	5.0	0	140	Topas	42.35	31.19	25.18	9.98
02-0775-0394-05	200	200	87.0	1.0	6.0	5.0	5.0	0	100	Zeonor	42.35	31.19	25.18	9.98
02-0776-0395-01	400	200	87.0	1.0	6.0	5.0	5.0	0	175	PMMA	42.35	31.19	25.18	9.98
02-0777-0395-02	400	200	87.0	1.0	6.0	5.0	5.0	0	140	Topas	42.35	31.19	25.18	9.98
02-0778-0395-05	400	200	87.0	1.0	6.0	5.0	5.0	0	100	Zeonor	42.35	31.19	25.18	9.98

3.4.1.3 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 (09-0599-0000-12). These fittings allow for high pressure connections.

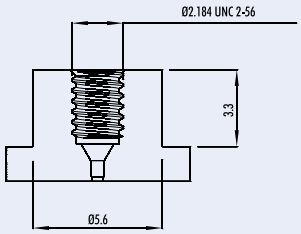


Fig. 51: Detail of thread in cross-shaped channel chip fluidic interface

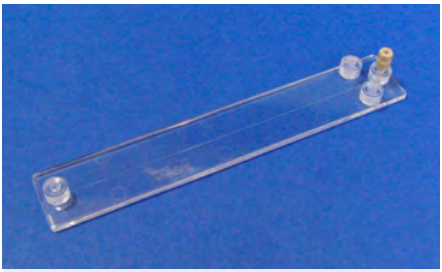


Fig. 52: Cross-shaped channel chips with embedded threads to connect with LabSmith's one piece fittings

Product Code	Description	Material	Price [€] 1+	10+
03-0780-0106-01	Cross-shaped channel chip with threads in the fluidic interface to connect with LabSmith one piece fitting (09-0599-0000-12)	PMMA	62.40	43.60

3.4.2 Cross-shaped channel chips – Extended size platform II

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

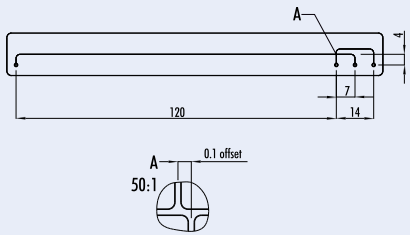


Fig. 53: Details of cross-shaped channel chip with through holes

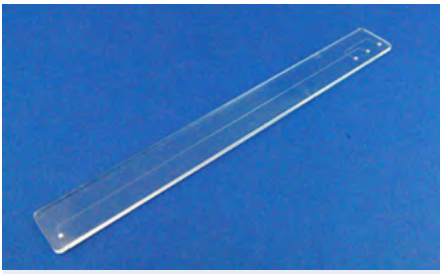


Fig. 54: Cross-shaped channel chip with through-holes

Product Code	Channel Width [µm]	Channel Depth [µm]	Cover Lid Thickness [µm]	Material	Price [€/chip] 1+	10+	100+
02-1054-0189-01	50	50	175	PMMA	68.60	44.60	28.40
02-1055-0189-02	50	50	140	Topas	68.60	44.60	28.40

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

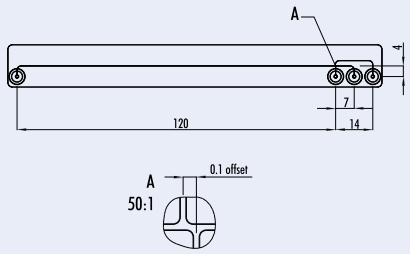


Fig. 55: Details of cross-shaped channel chip with Luer interfaces

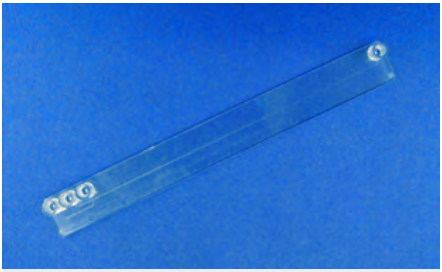


Fig. 56: Cross-shaped channel chip with Luer interfaces

Product Code	Channel Width [µm]	Channel Depth [µm]	Cover Lid Thickness [µm]	Material	Price [€/chip] 1+	10+	100+
02-1056-0189-01	50	50	175	PMMA	68.60	44.60	28.40
02-1057-0189-02	50	50	140	Topas	68.60	44.60	28.40

3.4.3 Cross-shaped channel chips – Microscopy slide format – Fluidic interface: Mini Luer

These chips offer two separate channel structures with crossing channels on each device. One of those with, one without a channel offset.

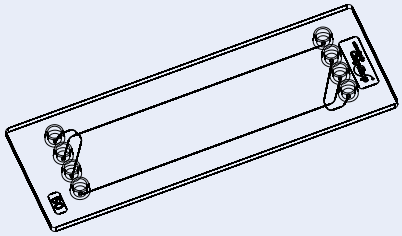


Fig. 57: Schematic drawing cross-shaped channel chips 160 and 161

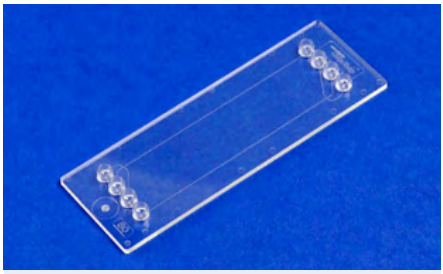


Fig. 58: Cross-shaped channel chip in the format of a microscopy slide with Mini Luer fluidic interfaces

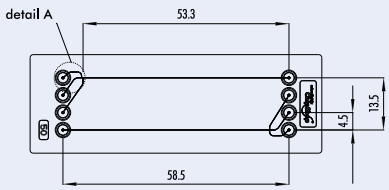


Fig. 59: Detail cross-shaped channel chip 160

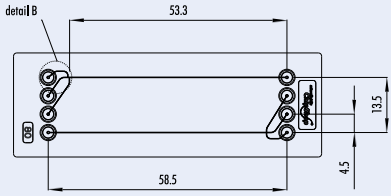


Fig. 60: Detail cross-shaped channel chip 161

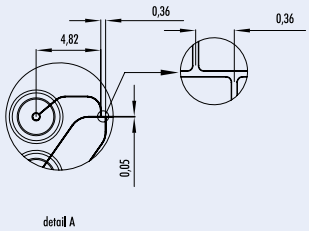


Fig. 61: Detail of channel offset in chip 160

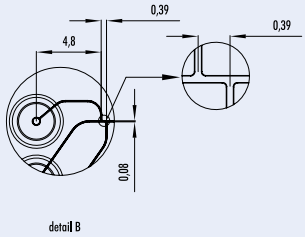


Fig. 62: Detail of channel offset in chip 161

Product Code	Channel Width [µm]	Channel Depth [µm]	Cover Lid Thickness [µm]	Material	Price [€/chip] 1+	10+	30+
02-1050-0160-01	50	50	175	PMMA	42.50	31.20	23.50
02-1051-0160-02	50	50	140	Topas	42.50	31.20	23.50
02-1052-0161-01	80	80	175	PMMA	42.50	31.20	23.50
02-1053-0161-02	80	80	140	Topas	42.50	31.20	23.50

3.4.4 Cross-shaped channel chips 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.

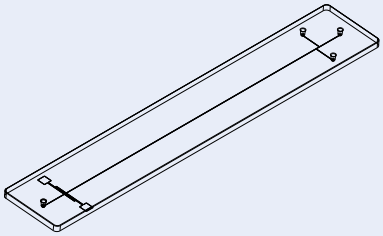


Fig. 63: Schematic drawing of the cross-shaped channel chip with electrodes

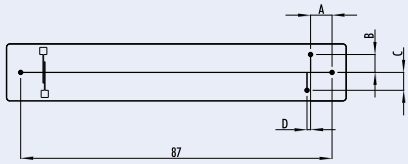


Fig. 64: Detail of cross-shaped channel chip with electrodes

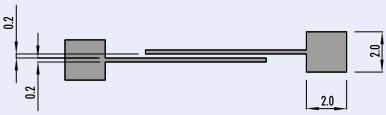


Fig. 65: Details of the electrodes

Fig. 66: Cross-shaped channel chips with through holes and electrodes

Product Code	Channel Width	Channel Depth	Channel Length	Hole Diameter	Geometry A	Geometry B	Geometry C	Geometry D	Geometry E	Lid Thickness	Material	Price [€/chip] 1+	Price [€/chip] 10+	Price [€/chip] 30+
	[µm]	[µm]	[mm]	[mm]	[mm]					[µm]				
03-0118-0082-01	50	50	87.8	1.0	6.0	5.0	5.0	0	0.2	175	PMMA	155.00	145.00	125.00
03-0120-0201-01	50	50	87.8	1.0	6.0	5.0	5.0	0.1	0.2	175	PMMA	155.00	145.00	125.00

3.4.5 Cross-shaped channel chips 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.

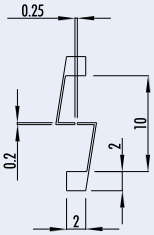


Fig. 67: Details of the electrodes

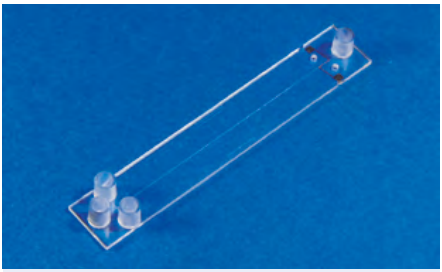


Fig. 68: Cross-shaped channel chip with electrodes for contactless conductivity detection

Product Code	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+	Price [€/chip] 10+	Price [€/chip] 100+
03-0110-0082-01	50	50	87.0	1.0	6.0	5.0	5.0	0	60	PMMA	125.00	85.00	32.50
03-0111-0201-01	50	50	87.0	1.0	6.0	5.0	5.0	0.1	60	PMMA	125.00	85.00	32.50
03-0798-0166-01	100	100	87.0	1.0	6.0	5.0	5.0	0	60	PMMA	125.00	85.00	32.50
03-0799-0166-05	100	100	87.0	1.0	6.0	5.0	5.0	0	50	Zeonor	125.00	85.00	32.50
03-0794-0394-01	200	200	87.0	1.0	6.0	5.0	5.0	0	60	PMMA	125.00	85.00	32.50
03-0795-0394-05	200	200	87.0	1.0	6.0	5.0	5.0	0	50	Zeonor	125.00	85.00	32.50
03-0796-0395-01	400	200	87.0	1.0	6.0	5.0	5.0	0	60	PMMA	125.00	85.00	32.50
03-0797-0395-05	400	200	87.0	1.0	6.0	5.0	5.0	0	50	Zeonor	125.00	85.00	32.50

3.5 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.

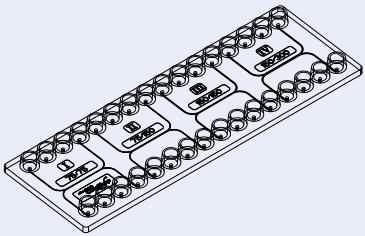


Fig. 69: Schematic drawing of the H-shaped channel chip Fluidic 164

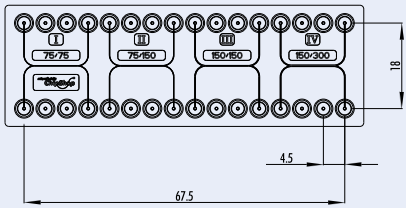


Fig. 70: Detail of H-shaped channel chip

Product Code	Channel Dimensions I Width inlet & outlet [µm]	II [µm]	III [µm]	IV [µm]	All Depth [µm]	Lid Thickness [µm]	Material	Price [€/chip] 1+	10+	30+
04-0129-0164-01	75/75	75/150	150/150	150/300	75	175	PMMA	42.50	31.20	23.50
04-0130-0164-02	75/75	75/150	150/150	150/300	75	140	Topas	42.50	31.20	23.50

3.6 Sample preparation and reaction cavity chips – Fluidic interface: Mini Luer

The sample preparation chips have the format of a microscopy slide (75.5 mm x 25.5 mm x 1.5 mm) and are equipped with female Mini Luer connectors. Their key microfluidic elements are reaction chambers of various volumes in order to extract the 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.

Instrumentation: If you are interested in basic instruments for bead actuation and temperature control for the sample preparation chips illustrated in Fig. 71-78 please have a look at our ChipGenie edition P in Chapter 10.

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.

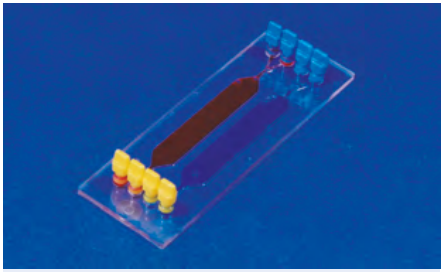


Fig. 71: Rhombic chamber chip filled

Fig. 72: Rhombic chamber chip in handling frame connected to PCR chip

3.6.1 Rhombic chamber chip eP1

The rhombic chamber chips eP1 can be used with our ChipGenie edition P instrument, see Chapter 10, page 173

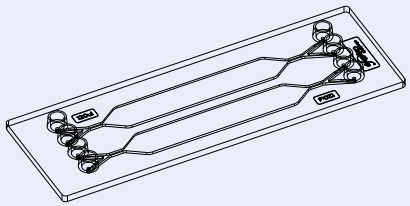


Fig. 73: Schematic drawing of the rhombic chamber chip Fluidic 172

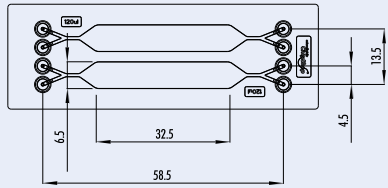


Fig. 74: Rhombic chamber chip – 120 µl chamber volume

Product Code	Chamber Volume [µl]	Chamber Depth [µm]	Lid Thickness [µm]	Material	Surface Treatment	Price [€/chip] 1+	10+	100+
12-0901-0172-01	120	500	175	PMMA	-	36.20	24.30	16.10
12-0902-0172-02	120	500	140	Topas	-	36.20	24.30	16.10
12-0903-0172-03	120	500	175	PC	-	36.20	24.30	16.10
12-0904-0172-05	120	500	188	Zeonor	-	36.20	24.30	16.10
12-1017-0172-07	120	500	125	PS	-	36.20	24.30	16.10
12-0905-0172-01	120	500	175	PMMA	hydrophilized	39.20	26.30	17.80
12-0906-0172-02	120	500	140	Topas	hydrophilized	39.20	26.30	17.80
12-0907-0172-03	120	500	175	PC	hydrophilized	39.20	26.30	17.80
12-0908-0172-05	120	500	188	Zeonor	hydrophilized	39.20	26.30	17.80
12-1018-0172-07	120	500	125	PS	hydrophilized	39.20	26.30	17.80

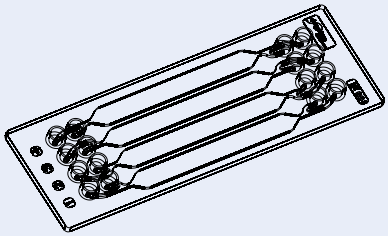


Fig. 75: Schematic drawing of the rhombic chamber chip Fluidic 221

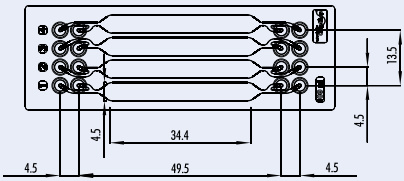


Fig. 76: Rhombic chamber chip – 100 µl chamber volume

Product Code	Chamber Volume [µl]	Chamber Depth [µm]	Lid Thickness [µm]	Material	Surface Treatment	Price [€/chip] 1+	10+	100+
12-0909-0221-01	100	600	175	PMMA	-	36.20	24.30	16.10
12-0910-0221-02	100	600	140	Topas	-	36.20	24.30	16.10
12-0911-0221-05	100	600	188	Zeonor	-	36.20	24.30	16.10
12-0912-0221-01	100	600	175	PMMA	hydrophilized	39.20	26.30	17.80
12-0913-0221-02	100	600	140	Topas	hydrophilized	39.20	26.30	17.80
12-0914-0221-05	100	600	188	Zeonor	hydrophilized	39.20	26.30	17.80

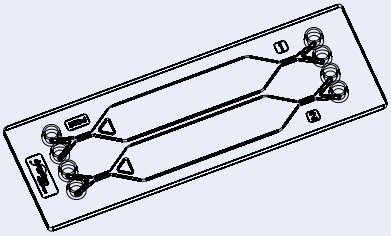


Fig. 77: Schematic drawing of the rhombic chamber chip Fluidic 194

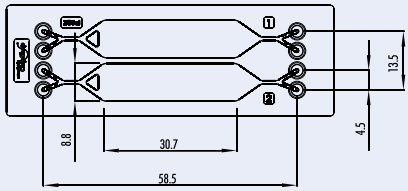


Fig. 78: Rhombic chamber chip – 250 µl chamber volume

Product Code	Chamber Volume [µl]	Chamber Depth [µm]	Lid Thickness [µm]	Material	Surface Treatment	Price [€/chip] 1+	10+	100+
12-0915-0194-01	250	800	175	PMMA	-	36.20	24.30	16.10
12-0916-0194-02	250	800	140	Topas	-	36.20	24.30	16.10
12-0917-0194-05	250	800	188	Zeonor	-	36.20	24.30	16.10
12-0918-0194-01	250	800	175	PMMA	hydrophilized	39.20	26.30	17.80
12-0919-0194-02	250	800	140	Topas	hydrophilized	39.20	26.30	17.80
12-0920-0194-05	250	800	188	Zeonor	hydrophilized	39.20	26.30	17.80

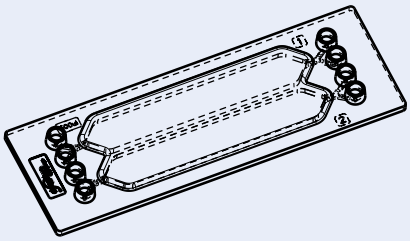


Fig. 79: Schematic drawing of rhombic chamber chip Fluidic 844

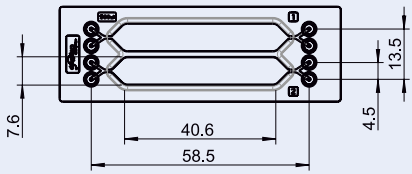


Fig. 80: Rhombic chamber chip Fluidic 844 – 500 µl chamber volume

Product Code	Chamber Volume [µl]	Chamber Depth [µm]	Lid Thickness [µm]	Material	Surface Treatment	Price [€/chip] 1+	10+	100+
12-1081-0844-01	500	1,500	175	PMMA	-	36.20	24.30	16.10
12-1082-0844-02	500	1,500	140	Topas	-	36.20	24.30	16.10
12-1083-0844-05	500	1,500	188	Zeonor	-	36.20	24.30	16.10
12-1084-0844-07	500	1,500	125	PS	-	36.20	24.30	16.10
12-1085-0844-01	500	1,500	175	PMMA	hydrophilized	39.20	26.30	17.80
12-1086-0844-02	500	1,500	140	Topas	hydrophilized	39.20	26.30	17.80
12-1087-0844-05	500	1,500	188	Zeonor	hydrophilized	39.20	26.30	17.80
12-1088-0844-07	500	1,500	125	PS	hydrophilized	39.20	26.30	17.80

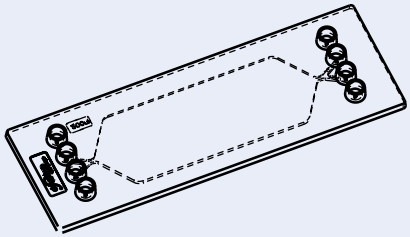


Fig. 81: Schematic drawing of rhombic chamber chip Fluidic 845

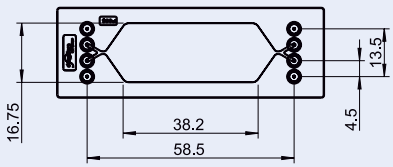


Fig. 82: Rhombic chamber chip Fluidic 845 – 500 µl chamber volume

Product Code	Chamber Volume [µl]	Chamber Depth [µm]	Lid Thickness [µm]	Material	Surface Treatment	Price [€/chip] 1+	10+	100+
12-1089-0845-01	500	700	175	PMMA	-	36.20	24.30	16.10
12-1090-0845-02	500	700	140	Topas	-	36.20	24.30	16.10
12-1091-0845-05	500	700	188	Zeonor	-	36.20	24.30	16.10
12-1092-0845-07	500	700	125	PS	-	36.20	24.30	16.10
12-1093-0845-01	500	700	175	PMMA	hydrophilized	39.20	26.30	17.80
12-1094-0845-02	500	700	140	Topas	hydrophilized	39.20	26.30	17.80
12-1095-0845-05	500	700	188	Zeonor	hydrophilized	39.20	26.30	17.80
12-1096-0845-07	500	700	125	PS	hydrophilized	39.20	26.30	17.80

3.6.2 Rhombic chamber chip eP2

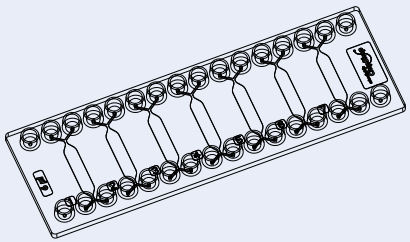


Fig. 83: Schematic drawing of the rhombic chamber chip Fluidic 132

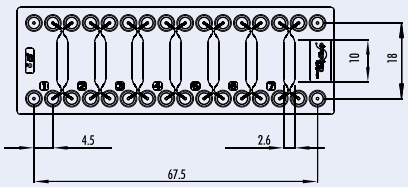


Fig. 84: Rhombic chamber chip – 6 µl chamber volume

Product Code	Chamber Volume [µl]	Chamber Depth [µm]	Lid Thickness [µm]	Material	Surface Treatment	Price [€/chip] 1+	10+	100+
12-0921-0132-01	6	200	175	PMMA	-	36.20	24.30	16.10
12-0922-0132-02	6	200	140	Topas	-	36.20	24.30	16.10
12-0923-0132-05	6	200	188	Zeonor	-	36.20	24.30	16.10
12-0924-0132-01	6	200	175	PMMA	hydrophilized	39.20	26.30	17.80
12-0925-0132-02	6	200	140	Topas	hydrophilized	39.20	26.30	17.80
12-0926-0132-05	6	200	188	Zeonor	hydrophilized	39.20	26.30	17.80

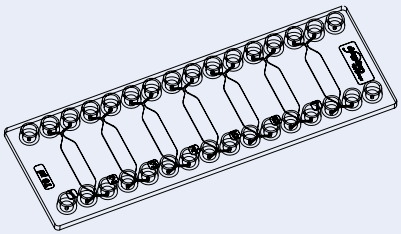


Fig. 85: Schematic drawing of the rhombic chamber chip Fluidic 439

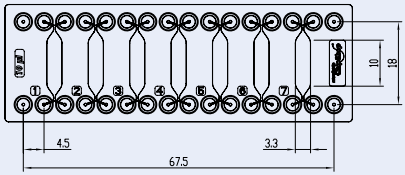


Fig. 86: Rhombic chamber chip – chamber volume 10 µl

Product Code	Chamber Volume [µl]	Chamber Depth [µm]	Lid Thickness [µm]	Material	Surface Treatment	Price [€/chip] 1+	10+	100+
12-0960-0439-01	10	250	175	PMMA	-	36.20	24.30	16.10
12-0961-0439-02	10	250	140	Topas	-	36.20	24.30	16.10
12-0962-0439-05	10	250	188	Zeonor	-	36.20	24.30	16.10
12-0963-0439-01	10	250	175	PMMA	hydrophilized	39.20	26.30	17.80
12-0964-0439-02	10	250	140	Topas	hydrophilized	39.20	26.30	17.80
12-0965-0439-05	10	250	188	Zeonor	hydrophilized	39.20	26.30	17.80

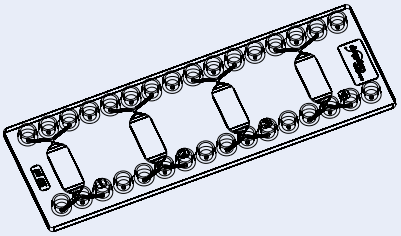


Fig. 87: Schematic drawing of the rhombic chamber chip Fluidic 131

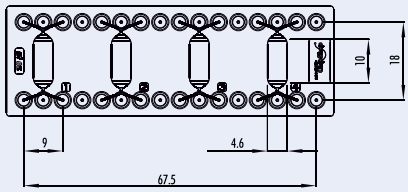


Fig. 88: Rhombic chamber chip – 20 µl chamber volume

Product Code	Chamber Volume [µl]	Chamber Depth [µm]	Lid Thickness [µm]	Material	Surface Treatment	Price [€/chip] 1+	10+	100+
12-0927-0131-01	20	400	175	PMMA	-	36.20	24.30	16.10
12-0928-0131-02	20	400	140	Topas	-	36.20	24.30	16.10
12-0929-0131-05	20	400	188	Zeonor	-	36.20	24.30	16.10
12-0930-0131-01	20	400	175	PMMA	hydrophilized	39.20	26.30	17.80
12-0931-0131-02	20	400	140	Topas	hydrophilized	39.20	26.30	17.80
12-0932-0131-05	20	400	188	Zeonor	hydrophilized	39.20	26.30	17.80

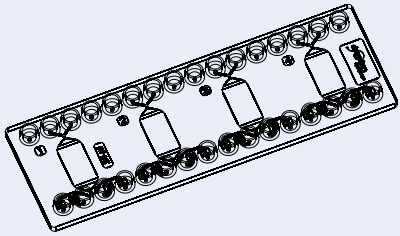


Fig. 89: Schematic drawing of the rhombic chamber chip Fluidic 133

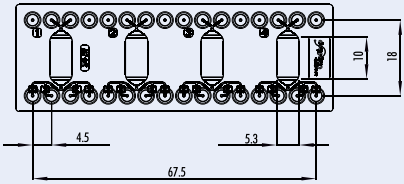


Fig. 90: Rhombic chamber chip – 24 µl chamber volume

Product Code	Chamber Volume [µl]	Chamber Depth [µm]	Lid Thickness [µm]	Material	Surface Treatment	Price [€/chip] 1+	10+	100+
12-0933-0133-01	24	400	175	PMMA	-	36.20	24.30	16.10
12-0934-0133-02	24	400	140	Topas	-	36.20	24.30	16.10
12-0935-0133-05	24	400	188	Zeonor	-	36.20	24.30	16.10
12-0936-0133-01	24	400	175	PMMA	hydrophilized	39.20	26.30	17.80
12-0937-0133-02	24	400	140	Topas	hydrophilized	39.20	26.30	17.80
12-0938-0133-05	24	400	188	Zeonor	hydrophilized	39.20	26.30	17.80

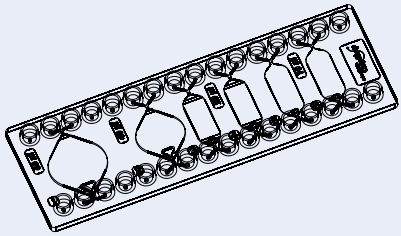


Fig. 91: Schematic drawing of the rhombic chamber chip Fluidic 134

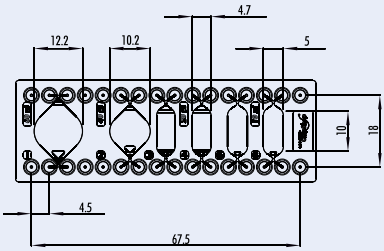


Fig. 92: Rhombic chamber chip – chamber volumes: 60 µl, 40 µl, 2 x 20 µl, 2 x 10 µl

Product Code	Chamber Volume [µl]	Chamber Depth [µm]	Lid Thickness [µm]	Material	Surface Treatment	Price [€/chip] 1+	10+	100+
12-0939-0134-01	10/10 20/20 40/60	200/200 400/400 540/540	175	PMMA	-	36.20	24.30	16.10
12-0940-0134-02	10/10 20/20 40/60	200/200 400/400 540/540	140	Topas	-	36.20	24.30	16.10
12-0941-0134-05	10/10 20/20 40/60	200/200 400/400 540/540	188	Zeonor	-	36.20	24.30	16.10
12-0942-0134-01	10/10 20/20 40/60	200/200 400/400 540/540	175	PMMA	hydrophilized	39.20	26.30	17.80
12-0943-0134-02	10/10 20/20 40/60	200/200 400/400 540/540	140	Topas	hydrophilized	39.20	26.30	17.80
12-0944-0134-05	10/10 20/20 40/60	200/200 400/400 540/540	188	Zeonor	hydrophilized	39.20	26.30	17.80

3.6.3 Reaction chamber chips

3.6.3.1 Reaction chamber chip – 2.5 µl volume

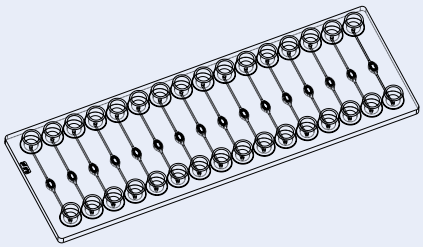


Fig. 93: Schematic drawing of reaction chamber chip Fluidic 843 – chamber volume 2.5 µl

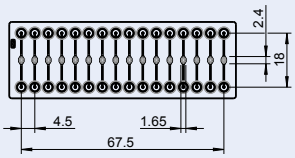


Fig. 94: Reaction chamber chip Fluidic 843 – chamber volume 2.5 µl

Product Code	Chamber Volume [µl]	Chamber Depth [µm]	Lid Thickness [µm]	Material	Surface Treatment	Price [€/chip] 1+	10+	100+
12-1075-0843-02	2.5	500	175	Topas	-	36.20	24.30	16.10
12-1076-0843-03	2.5	500	175	PC	-	36.20	24.30	16.10
12-1077-0843-05	2.5	500	188	Zeonor	-	36.20	24.30	16.10
12-1078-0843-02	2.5	500	175	Topas	hydrophilized	39.20	26.30	17.80
12-1079-0843-03	2.5	500	175	PC	hydrophilized	39.20	26.30	17.80
12-1080-0843-05	2.5	500	188	Zeonor	hydrophilized	39.20	26.30	17.80

3.6.3.2 Reaction chamber chips – 5 µl volume

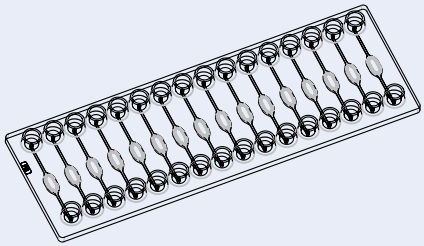


Fig. 95: Schematic drawing of reaction chamber chip Fluidic 750 – chamber volume 5 µl

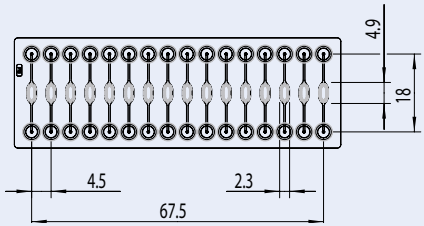


Fig. 96: Reaction chamber chip Fluidic 750 – chamber volume 5 µl

Product Code	Chamber Volume [µl]	Chamber Depth [µm]	Lid Thickness [µm]	Material	Surface Treatment	Price [€/chip] 1+	10+	100+
12-1461-0750-02	5	500	175	Topas	-	36.20	24.30	16.10
12-1462-0750-03	5	500	175	PC	-	36.20	24.30	16.10
12-1463-0750-05	5	500	188	Zeonor	-	36.20	24.30	16.10
12-1464-0750-02	5	500	175	Topas	hydrophilized	39.20	26.30	17.80
12-1465-0750-03	5	500	175	PC	hydrophilized	39.20	26.30	17.80
12-1466-0750-05	5	500	188	Zeonor	hydrophilized	39.20	26.30	17.80

3.6.3.3 Reaction chamber chips – 10 µl volume

3.6.3.3.1 Reaction chamber chips – 10 µl volume – 350 µm chamber depth

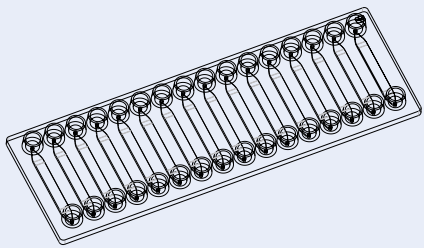


Fig. 97: Schematic drawing of reaction chamber chip Fluidic 561 – chamber volume 10 µl

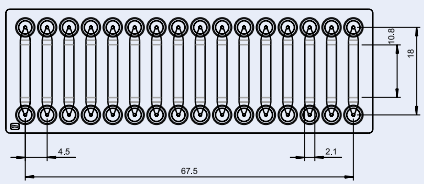


Fig. 98: Reaction chamber chip Fluidic 561 – chamber volume 10 µl

Product Code	Chamber Volume [µl]	Chamber Depth [µm]	Lid Thickness [µm]	Material	Surface Treatment	Price [€/chip] 1+	10+	100+
12-0972-0561-02	10	350	140	Topas	-	36.20	24.30	16.10
12-0973-0561-03	10	350	175	PC	-	36.20	24.30	16.10
12-0974-0561-05	10	350	188	Zeonor	-	36.20	24.30	16.10
12-0975-0561-02	10	350	140	Topas	hydrophilized	39.20	26.30	17.80
12-0976-0561-03	10	350	175	PC	hydrophilized	39.20	26.30	17.80
12-0977-0561-05	10	350	188	Zeonor	hydrophilized	39.20	26.30	17.80

3.6.3.3.2 Reaction chamber chips – 10 µl volume – 500 µm chamber depth

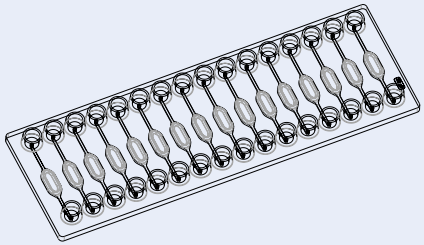


Fig. 99: Schematic drawing of reaction chamber chip Fluidic 585 – chamber volume 10 µl

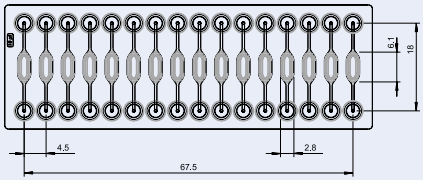


Fig. 100: Reaction chamber chip Fluidic 585 – chamber volume 10 µl

Product Code	Chamber Volume [µl]	Chamber Depth [µm]	Lid Thickness [µm]	Material	Surface Treatment	Price [€/chip] 1+	10+	100+
12-0978-0585-02	10	500	175	Topas	-	36.20	24.30	16.10
12-0979-0585-03	10	500	175	PC	-	36.20	24.30	16.10
12-0980-0585-05	10	500	188	Zeonor	-	36.20	24.30	16.10
12-0981-0585-02	10	500	175	Topas	hydrophilized	39.20	26.30	17.80
12-0982-0585-03	10	500	175	PC	hydrophilized	39.20	26.30	17.80
12-0983-0585-05	10	500	188	Zeonor	hydrophilized	39.20	26.30	17.80

3.6.3.3.3 Reaction chamber chips – 10 µl volume – 700 µm chamber depth

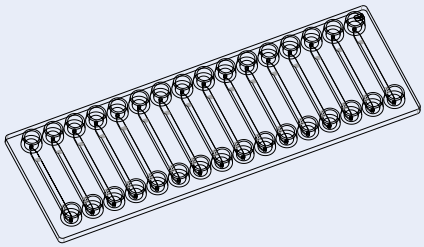


Fig. 101: Schematic drawing of reaction chamber chip Fluidic 558 – chamber volume 10 µl

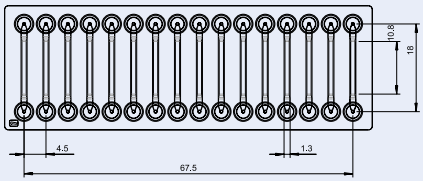


Fig. 102: Reaction chamber chip Fluidic 558 – chamber volume 10 µl

Product Code	Chamber Volume [µl]	Chamber Depth [µm]	Lid Thickness [µm]	Material	Surface Treatment	Price [€/chip] 1+	10+	100+
12-0984-0558-02	10	700	140	Topas	-	36.20	24.30	16.10
12-0985-0558-03	10	700	175	PC	-	36.20	24.30	16.10
12-0986-0558-05	10	700	188	Zeonor	-	36.20	24.30	16.10
12-0987-0558-02	10	700	140	Topas	hydrophilized	39.20	26.30	17.80
12-0988-0558-03	10	700	175	PC	hydrophilized	39.20	26.30	17.80
12-0989-0558-05	10	700	188	Zeonor	hydrophilized	39.20	26.30	17.80

3.6.3.4 Reaction chamber chips – 20 µl volume

3.6.3.4.1 Reaction chamber chips – 20 µl volume – 350 µm chamber depth

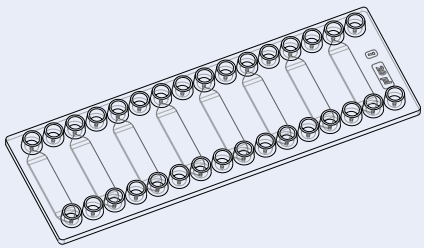


Fig. 103: Schematic drawing of reaction chamber chip Fluidic 559 – chamber volume 20 µl

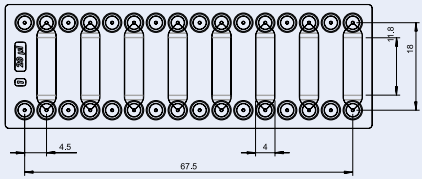


Fig. 104: Reaction chamber chip Fluidic 559 – chamber volume 20 µl

Product Code	Chamber Volume [µl]	Chamber Depth [µm]	Lid Thickness [µm]	Material	Surface Treatment	Price [€/chip] 1+	10+	100+
12-0990-0559-02	20	350	140	Topas	-	36.20	24.30	16.10
12-0991-0559-03	20	350	175	PC	-	36.20	24.30	16.10
12-0992-0559-05	20	350	188	Zeonor	-	36.20	24.30	16.10
12-0993-0559-02	20	350	140	Topas	hydrophilized	39.20	26.30	17.80
12-0994-0559-03	20	350	175	PC	hydrophilized	39.20	26.30	17.80
12-0995-0559-05	20	350	188	Zeonor	hydrophilized	39.20	26.30	17.80

3.6.3.4.2 Reaction chamber chips – 20 µl volume – 500 µm chamber depth

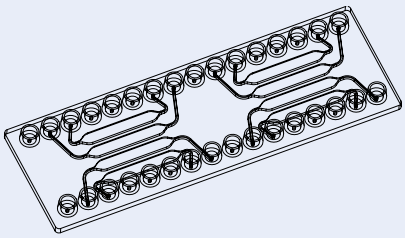


Fig. 105: Schematic drawing of the reaction chamber chip Fluidic 478

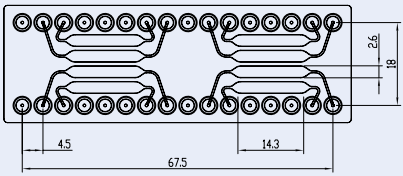


Fig. 106: Rhombic chamber chip – chamber volume 20 µl

Product Code	Chamber Volume [µl]	Chamber Depth [µm]	Lid Thickness [µm]	Material	Surface Treatment	Price [€/chip] 1+	10+	100+
12-0966-0478-01	20	500	175	PMMA	-	36.20	24.30	16.10
12-0967-0478-02	20	500	140	Topas	-	36.20	24.30	16.10
12-0968-0478-05	20	500	188	Zeonor	-	36.20	24.30	16.10
12-0969-0478-01	20	500	175	PMMA	hydrophilized	39.20	26.30	17.80
12-0970-0478-02	20	500	140	Topas	hydrophilized	39.20	26.30	17.80
12-0971-0478-05	20	500	188	Zeonor	hydrophilized	39.20	26.30	17.80

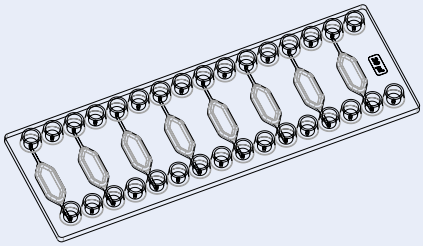


Fig. 107: Schematic drawing of the reaction chamber chip Fluidic 584

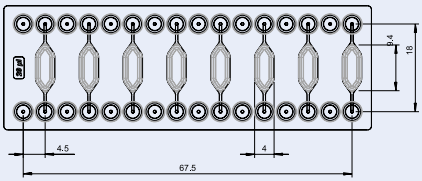


Fig. 108: Reaction chamber chip Fluidic 584 – chamber volume 20 µl

Product Code	Chamber Volume [µl]	Chamber Depth [µm]	Lid Thickness [µm]	Material	Surface Treatment	Price [€/chip] 1+	10+	100+
12-0996-0584-02	20	500	175	Topas	-	36.20	24.30	16.10
12-0997-0584-03	20	500	175	PC	-	36.20	24.30	16.10
12-0998-0584-05	20	500	188	Zeonor	-	36.20	24.30	16.10
12-0999-0584-02	20	500	175	Topas	hydrophilized	39.20	26.30	17.80
12-1000-0584-03	20	500	175	PC	hydrophilized	39.20	26.30	17.80
12-1400-0584-05	20	500	188	Zeonor	hydrophilized	39.20	26.30	17.80

3.6.3.4.3 Reaction chamber chips – 20 µl volume – 700 µm chamber depth

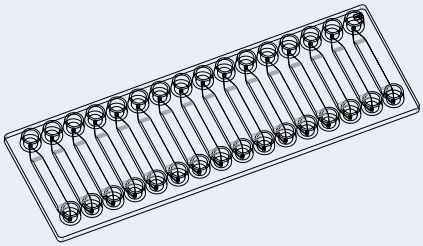


Fig. 109: Schematic drawing of the reaction chamber chip Fluidic 556

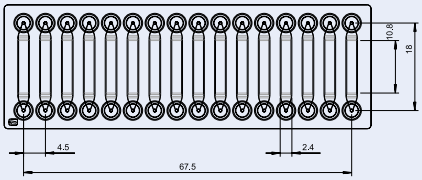


Fig. 110: Reaction chamber chip Fluidic 556 – chamber volume 20 µl

Product Code	Chamber Volume [µl]	Chamber Depth [µm]	Lid Thickness [µm]	Material	Surface Treatment	Price [€/chip] 1+	10+	100+
12-1401-0556-02	20	700	140	Topas	-	36.20	24.30	16.10
12-1402-0556-03	20	700	175	PC	-	36.20	24.30	16.10
12-1403-0556-05	20	700	188	Zeonor	-	36.20	24.30	16.10
12-1404-0556-02	20	700	140	Topas	hydrophilized	39.20	26.30	17.80
12-1405-0556-03	20	700	175	PC	hydrophilized	39.20	26.30	17.80
12-1406-0556-05	20	700	188	Zeonor	hydrophilized	39.20	26.30	17.80

3.6.3.5 Reaction chamber chips – 50 µl volume

3.6.3.5.1 Reaction chamber chips – 50 µl volume – 350 µm chamber depth

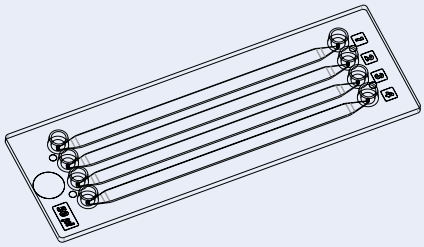


Fig. 111: Schematic drawing of the reaction chamber chip Fluidic 560

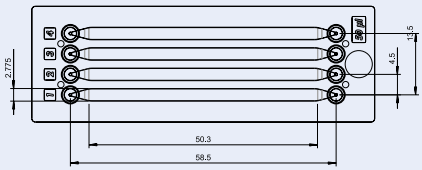


Fig. 112: Reaction chamber chip Fluidic 560 – chamber volume 50 µl

Product Code	Chamber Volume [µl]	Chamber Depth [µm]	Lid Thickness [µm]	Material	Surface Treatment	Price [€/chip] 1+	10+	100+
12-1407-0560-02	50	350	140	Topas	-	36.20	24.30	16.10
12-1408-0560-03	50	350	175	PC	-	36.20	24.30	16.10
12-1409-0560-05	50	350	188	Zeonor	-	36.20	24.30	16.10
12-1065-0560-07	50	350	125	PS	-	36.20	24.30	16.10
12-1410-0560-02	50	350	140	Topas	hydrophilized	39.20	26.30	17.80
12-1411-0560-03	50	350	175	PC	hydrophilized	39.20	26.30	17.80
12-1412-0560-05	50	350	188	Zeonor	hydrophilized	39.20	26.30	17.80
12-1066-0560-07	50	350	125	PS	hydrophilized	39.20	26.30	17.80

3.6.3.5.2 Reaction chamber chips – 50 µl volume – 500 µm chamber depth

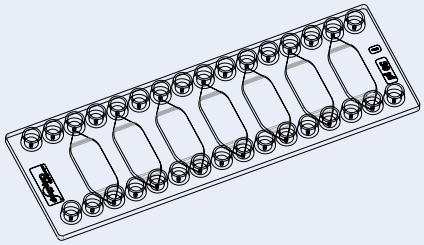


Fig. 113: Schematic drawing of the reaction chamber chip Fluidic 557

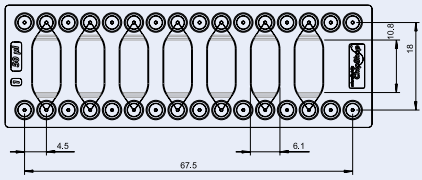


Fig. 114: Reaction chamber chip Fluidic 557 – chamber volume 50 µl

Product Code	Chamber Volume [µl]	Chamber Depth [µm]	Lid Thickness [µm]	Material	Surface Treatment	Price [€/chip] 1+	10+	100+
12-1413-0557-02	50	500	140	Topas	-	36.20	24.30	16.10
12-1414-0557-03	50	500	175	PC	-	36.20	24.30	16.10
12-1415-0557-05	50	500	188	Zeonor	-	36.20	24.30	16.10
12-1067-0557-07	50	500	125	PS	-	36.20	24.30	16.10
12-1416-0557-02	50	500	140	Topas	hydrophilized	39.20	26.30	17.80
12-1417-0557-03	50	500	175	PC	hydrophilized	39.20	26.30	17.80
12-1418-0557-05	50	500	188	Zeonor	hydrophilized	39.20	26.30	17.80
12-1068-0557-07	50	500	125	PS	hydrophilized	39.20	26.30	17.80

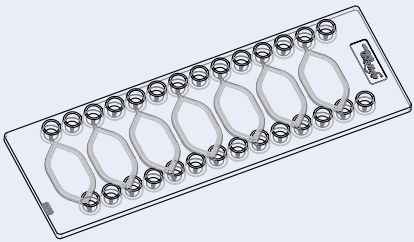


Fig. 115: Schematic drawing of reaction chamber chip Fluidic 842 – chamber volume 50 µl

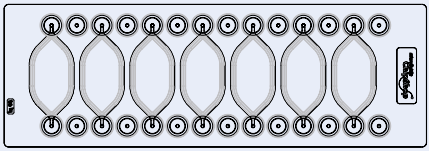


Fig. 116: Reaction chamber chip Fluidic 842 – chamber volume 50 µl

Product Code	Chamber Volume [µl]	Chamber Depth [µm]	Lid Thickness [µm]	Material	Surface Treatment	Price [€/chip] 1+	10+	100+
12-1069-0842-02	50	500	175	Topas	-	36.20	24.30	16.10
12-1070-0842-03	50	500	175	PC	-	36.20	24.30	16.10
12-1071-0842-05	50	500	188	Zeonor	-	36.20	24.30	16.10
12-1072-0842-02	50	500	175	Topas	hydrophilized	39.20	26.30	17.80
12-1073-0842-03	50	500	175	PC	hydrophilized	39.20	26.30	17.80
12-1074-0842-05	50	500	188	Zeonor	hydrophilized	39.20	26.30	17.80

3.6.3.6 Reaction chamber chips – 400 µl volume

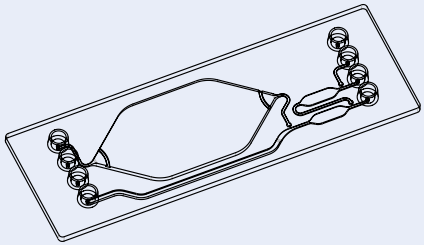


Fig. 117: Schematic drawing of reaction chamber chip Fluidic 753 – chamber volume 400 µl

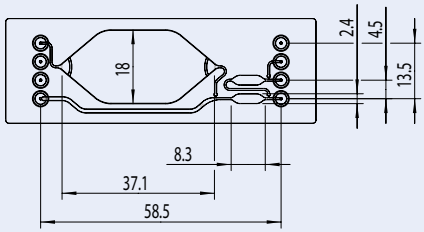


Fig. 118: Reaction chamber chip Fluidic 753 – chamber volume 400 µl

Product Code	Chamber Volume [µl]	Volume 2 & 3 [µm]	Lid Thickness [µm]	Material	Surface Treatment	Price [€/chip] 1+	10+	100+
12-1467-0753-02	400	4.1	175	Topas	-	36.20	24.30	16.10
12-1468-0753-03	400	4.1	175	PC	-	36.20	24.30	16.10
12-1469-0753-05	400	4.1	188	Zeonor	-	36.20	24.30	16.10
12-1470-0753-02	400	4.1	175	Topas	hydrophilized	39.20	26.30	17.80
12-1471-0753-03	400	4.1	175	PC	hydrophilized	39.20	26.30	17.80
12-1472-0753-05	400	4.1	188	Zeonor	hydrophilized	39.20	26.30	17.80

3.6.3.7 Reaction chamber chips – various volume chambers

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 channel depth influence on the assay and the measurement. These chips assist in the choice of the right channel dimensions in the design process of integrated microfluidic devices.

3.6.3.7.1 Reaction chamber chips – various volume chambers – fluidic interfaces: Mini Luer

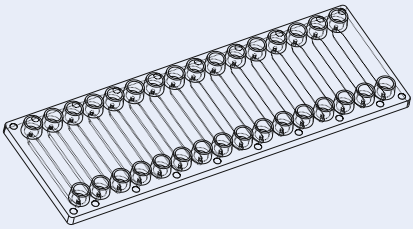


Fig. 119: Schematic drawing of the reaction chamber chip Fluidic 620

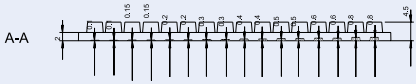


Fig. 120: Schematic drawing of reaction chamber chip – Fluidic 620

Product Code	Chamber Volume [µl]	Chamber Depth [µm]	Lid Thickness [µm]	Material	Surface Treatment	Price [€/chip] 1+	10+	100+
12-1419-0620-01	3.6 – 28.8	100 - 800	175	PMMA	-	36.20	24.30	16.10
12-1420-0620-02	3.6 – 28.8	100 - 800	140	Topas	-	36.20	24.30	16.10
12-1421-0620-07	3.6 – 28.8	100 - 800	125	PS	-	36.20	24.30	16.10
12-1422-0620-01	3.6 – 28.8	100 - 800	175	PMMA	hydrophilized	39.20	26.30	17.80
12-1423-0620-02	3.6 – 28.8	100 - 800	140	Topas	hydrophilized	39.20	26.30	17.80
12-1424-0620-07	3.6 – 28.8	100 - 800	125	PS	hydrophilized	39.20	26.30	17.80

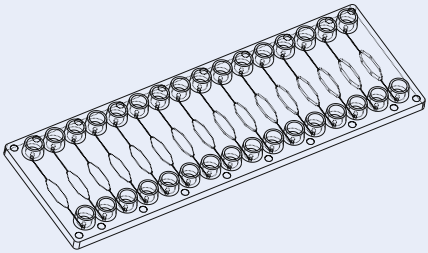


Fig. 121: Schematic drawing of the reaction chamber chip Fluidic 621

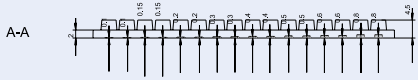


Fig. 122: Schematic drawing of reaction chamber chip – Fluidic 621

Product Code	Chamber Volume [µl]	Chamber Depth [µm]	Lid Thickness [µm]	Material	Surface Treatment	Price [€/chip] 1+	10+	100+
12-1425-0621-01	1.2 – 10.2	100 - 800	175	PMMA	-	36.20	24.30	16.10
12-1426-0621-02	1.2 – 10.2	100 - 800	140	Topas	-	36.20	24.30	16.10
12-1427-0621-07	1.2 – 10.2	100 - 800	125	PS	-	36.20	24.30	16.10
12-1428-0621-01	1.2 – 10.2	100 - 800	175	PMMA	hydrophilized	39.20	26.30	17.80
12-1429-0621-02	1.2 – 10.2	100 - 800	140	Topas	hydrophilized	39.20	26.30	17.80
12-1430-0621-07	1.2 – 10.2	100 - 800	125	PS	hydrophilized	39.20	26.30	17.80

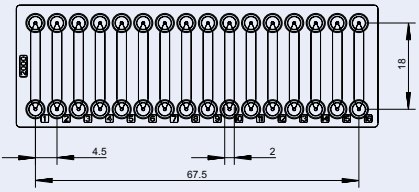


Fig. 123: Schematic drawing of reaction chamber chip Fluidic 625

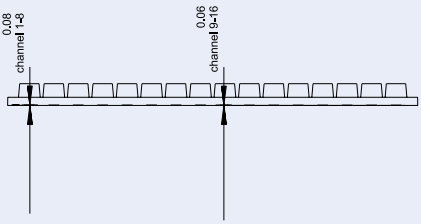


Fig. 124: Schematic cross-section of reaction chamber chip Fluidic 625. The chip contains 8 channels with 80 µm depth and 8 channels of 60 µm depth.

Product Code	Chamber Volume [µl]	Chamber Depth [µm]	Lid Thickness [µm]	Material	Surface Treatment	Price [€/chip] 1+	10+	100+
12-1441-0625-02	8 x 2.5 8 x 1.9	8 x 60 8 x 80	125	Topas	-	36.20	24.30	16.10
12-1442-0625-02	8 x 2.5 8 x 1.9	8 x 60 8 x 80	125	Topas	hydrophilized	39.20	26.30	17.80

3.6.3.7.2 Reaction chamber chips – various volume chambers – Pipetting interfaces

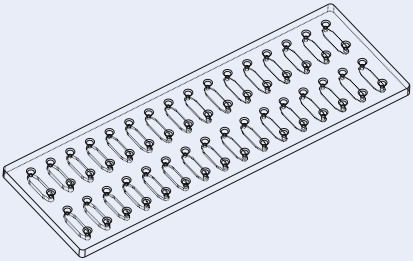


Fig. 125: Schematic drawing of the reaction chamber chip Fluidic 622

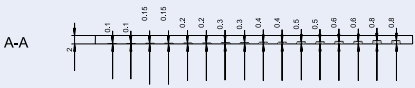


Fig. 126: Schematic drawing of reaction chamber chip – Fluidic 622

Product Code	Chamber Volume [µl]	Chamber Depth [µm]	Lid Thickness [µm]	Material	Surface Treatment	Price [€/chip] 1+	10+	100+
12-1431-0622-01	1.2 – 10.2	100 - 800	175	PMMA	-	36.20	24.30	16.10
12-1432-0622-02	1.2 – 10.2	100 - 800	140	Topas	-	36.20	24.30	16.10
12-1433-0622-07	1.2 – 10.2	100 - 800	125	PS	-	36.20	24.30	16.10
12-1434-0622-01	1.2 – 10.2	100 - 800	175	PMMA	hydrophilized	39.20	26.30	17.80
12-1435-0622-02	1.2 – 10.2	100 - 800	140	Topas	hydrophilized	39.20	26.30	17.80
12-1436-0622-07	1.2 – 10.2	100 - 800	125	PS	hydrophilized	39.20	26.30	17.80

3.6.4 PCR chamber chips with dead-end air reservoir

This family of chips allows to perform e.g. parallel batch PCR reactions from a single input. 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.

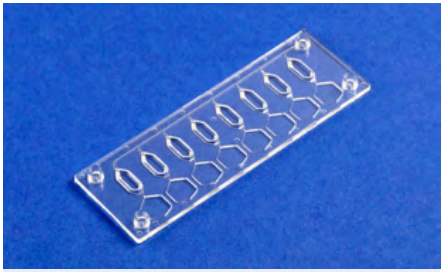


Fig. 127: Batch PCR Chip Fluidic 675 with 8 PCR chambers of 20 µl volume

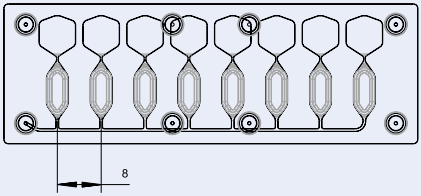


Fig. 128: Schematic drawing of batch PCR Chip Fluidic 675

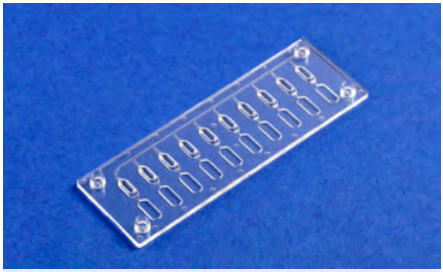


Fig. 129: Batch PCR chip Fluidic 683 with 10 PCR chambers of 10 µl volume

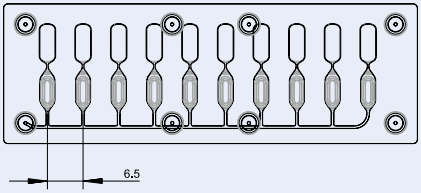


Fig. 130: Schematic drawing of batch PCR chip Fluidic 683

Product Code	Chamber Volume [µl]	Chamber Depth [µm]	Lid Thickness [µm]	Material	Surface Treatment	Price [€/chip] 1+	10+	100+
12-1437-0675-02	20	500	175	Topas	-	36.20	24.30	16.10
12-1438-0675-02	20	500	175	Topas	hydrophilized	39.20	26.30	17.80
12-1439-0683-02	10	500	175	Topas	-	36.20	24.30	16.10
12-1440-0683-02	10	500	175	Topas	hydrophilized	39.20	26.30	17.80

3.7 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. with combining droplet generation with droplet storage for an afterwards separate optical analysis allowing a wide variety of experiments.

The chips can be operated in both pumping and suction modes. Please see page 245 chapter 16.2 for the general instruction on how to use the droplet generator chips.

As fluidic interfaces female Mini Luer and female Luer adapters are integrated. The female Luer adapter due to their large volume not only allow to serve as fluidic interface but also as liquid reservoir. Standard oils that are released by *microfluidic ChipShop* neither harming standard biological reactions nor the microfluidic chip materials can be found in the accessories chapter with recommendation for different chip materials.

3.7.1 Droplet generator chips – One channel designs – Fluidic interfaces: Mini Luer

On the format of a microscopy slide (75.5 mm x 25.5 mm x 1.5 mm) with female Mini Luer fluidic interfaces a droplet generator structure is placed with several inlet and outlet interfaces. The droplet generator chips are available with two different channel widths in the droplet generation region.

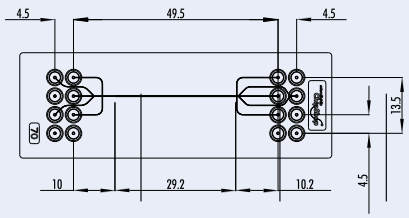


Fig. 131: Detail of droplet generator Fluidic 162

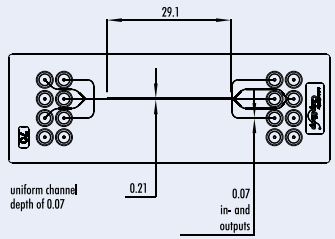


Fig. 132: Channel dimensions of droplet generator Fluidic 162

Product Code	Input Channel Width [µm]	Collection Channel Width [µm]	Channel Depth [µm]	Lid Thickness [µm]	Material	Price [€/chip] 1+	10+	100+
13-1001-0162-02	70	210	70	140	Topas	42.20	34.30	26.10
13-1002-0162-03	70	210	70	175	PC	42.20	34.30	26.10

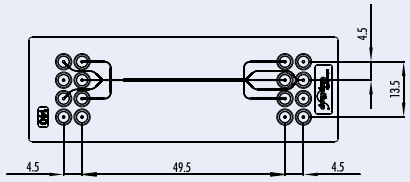


Fig. 133: Detail of droplet generator Fluidic 163

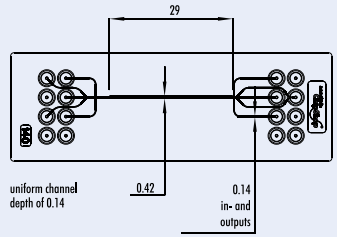


Fig. 134: Channel dimensions droplet generator Fluidic 163

Product Code	Input Channel Width [µm]	Collection Channel Width [µm]	Channel Depth [µm]	Lid Thickness [µm]	Material	Price [€/chip] 1+	10+	100+
13-1003-0163-02	140	420	140	140	Topas	42.20	34.30	26.10
13-1004-0163-03	140	420	140	175	PC	42.20	34.30	26.10

3.7.2 Droplet generator chips – Multi channel designs – Fluidic interfaces: Mini Luer

3.7.2.1 Droplet generator chips – Multi channel design – 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.

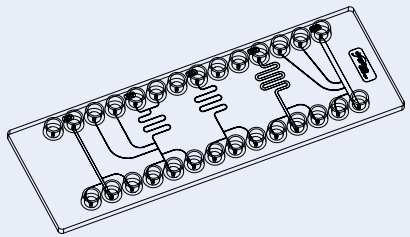


Fig. 135: Schematic drawing of droplet generator chip Fluidic 285

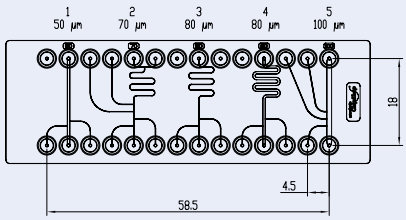


Fig. 136: Details droplet generator chip Fluidic 285

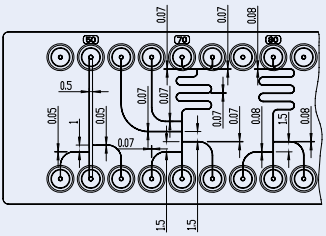


Fig. 137: Details of channel dimensions and off-sets of structures 1 – 3 of chip Fluidic 285

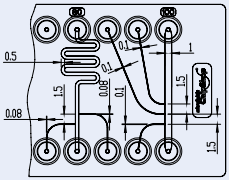


Fig. 138: Details of channel dimensions and off-sets of structures 4 – 5 of chip Fluidic 285

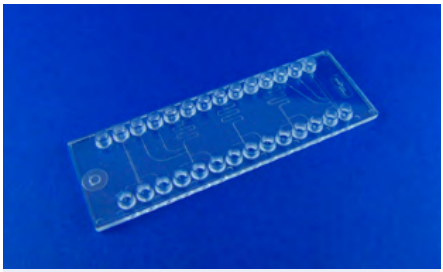


Fig. 139: Droplet generator Fluidic 285

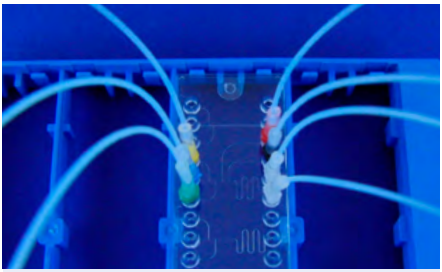


Fig. 140: Droplet generator chip Fluidic 285 in evaluation set-up

Product Code	Lid Thickness [µm]	Material	Price [€/chip] 1+	10+	100+
13-1005-0285-02	140	Topas	42.20	34.30	26.10
13-1006-0285-03	175	PC	42.20	34.30	26.10

3.7.2.2 Droplet generator chips – Fluidic interfaces: mini luer – Multi channel design – Droplet size variation

This droplet generator design combines size variations of one main design for the evaluation of generated droplet size under the desired conditions. There are eight droplet generators on each chip with channel dimensions at the droplet formation region of 80 µm, 70 µm, 60 µm and 50 µm channel width and height. Each size version comes with two different outlet channel width.

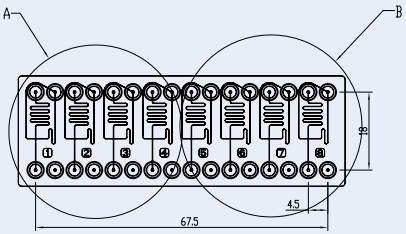


Fig. 141: Droplet generator Fluidic 440 – droplet size variation

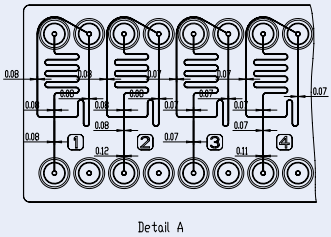


Fig. 142: Droplet generator – droplet size variation – details structures 1 - 4

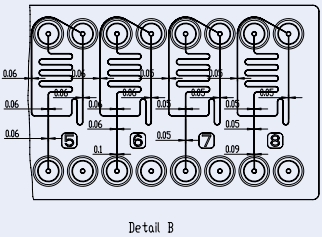


Fig. 143: Droplet generator – droplet size variation – details structures 5 - 8

Product Code	Lid Thickness [µm]	Material	Price [€/chip] 1+	10+	100+
13-1007-0440-02	140	Topas	42.20	34.40	26.10
13-1008-0440-03	175	PC	42.20	34.40	26.10

3.7.3 Droplet generator chips – Fluidic interfaces: Luer

3.7.3.1 Droplet generator chip – Four elements on one chip design – Fluidic interfaces: Luer

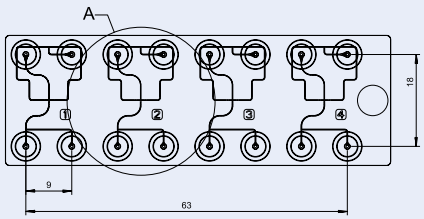


Fig. 144: Schematic drawing of droplet generator chip Fluidic 537

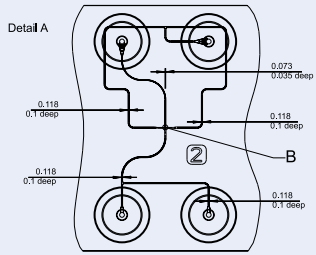


Fig. 145: Droplet generator chip Fluidic 537 – detail channel dimensions

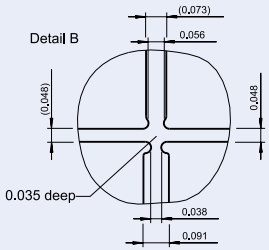


Fig. 146: Droplet generator chip Fluidic 537 – detail cross element

Product Code	Lid Thickness [µm]	Material	Price [€/chip] 1+	10+	100+
13-1009-0537-02	140	Topas	42.20	34.40	26.10
13-1010-0537-03	175	PC	42.20	34.40	26.10

3.7.3.2 Double emulsion (Droplet in droplet) generator chip – Three elements on one chip design – Fluidic interfaces: Luer

This droplet generator chip with a double-cross geometry 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.

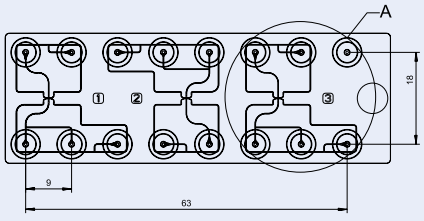


Fig. 147: Schematic drawing of droplet in droplet generator chip Fluidic 536

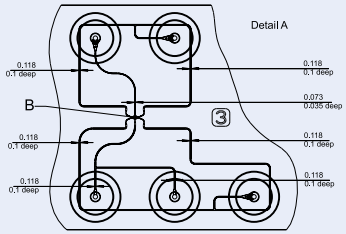


Fig. 148: Droplet in droplet generator chip Fluidic 536 – channel dimension

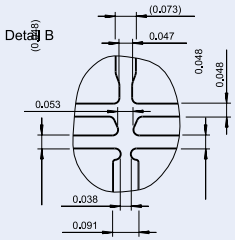


Fig. 149: Droplet in droplet generator chip Fluidic 536 – detail channel intersection element

Product Code	Lid Thickness [µm]	Material	Price [€/chip] 1+	10+	100+
13-1011-0536-02	140	Topas	42.20	34.40	26.10
13-1012-0536-03	175	PC	42.20	34.40	26.10

3.7.4 Droplet generation and storage chips

3.7.4.1 Droplet generation and storage chips – Fluidic interfaces: Mini Luer

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

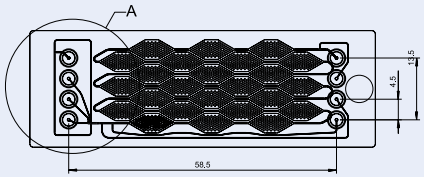


Fig. 150: Schematic drawing of droplet in droplet generator and storage chip Fluidic 488

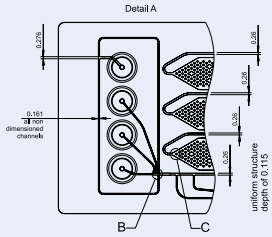


Fig. 151: Droplet in droplet generator and storage chip Fluidic 488 – detail channel dimensions

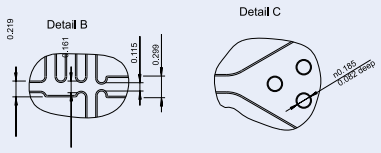


Fig. 152: Droplet in droplet generator and storage chip Fluidic 488 – detail channel intersection and storage element

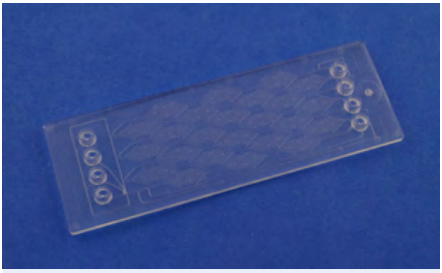


Fig. 153: Droplet in droplet generator chip Fluidic 488

Product Code	Lid Thickness [µm]	Material	Price [€/chip] 1+	10+	100+
13-1013-0488-02	140	Topas	42.20	34.40	26.10
13-1014-0488-03	175	PC	42.20	34.40	26.10

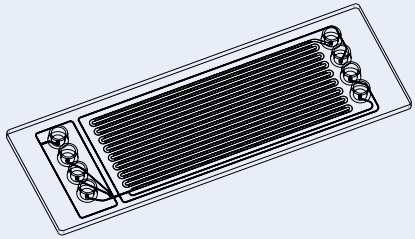


Fig. 154: Schematic drawing of droplet generation and storage chip – Fluidic 719

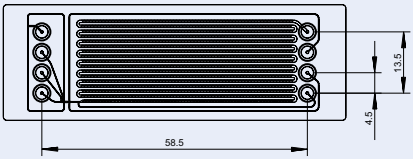


Fig. 155: Droplet generation and storage chip – Fluidic 719

Product Code	Lid Thickness [µm]	Material	Price [€/chip] 1+	10+	100+
13-1015-0719-02	140	Topas	42.20	34.40	26.10
13-1016-0719-03	175	PC	42.20	34.40	26.10

3.8 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.

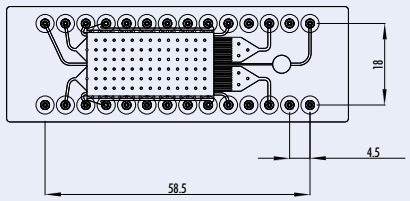


Fig. 156: Details of the field flow fractionation chip Fluidic 120

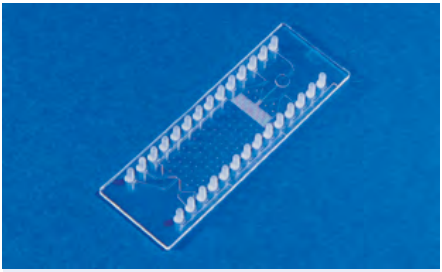


Fig. 157: Field flow fractionation chip Fluidic 120

Product Code	Lid Thickness [µm]	Material	Surface Treatment	Price [€/chip] 1+	10+	100+
14-1020-0120-03	175	PC	-	42.20	34.30	26.10
14-1021-0120-05	188	Zeonor	-	42.20	34.30	26.10
14-1022-0120-03	175	PC	hydrophilized	45.20	36.30	27.80
14-1023-0120-05	188	Zeonor	hydrophilized	45.20	36.30	27.80

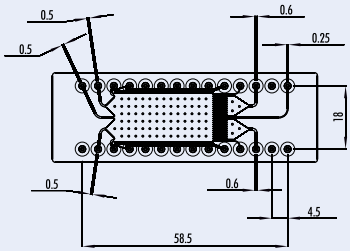


Fig. 158: Details of the field flow fractionation chip Fluidic 159

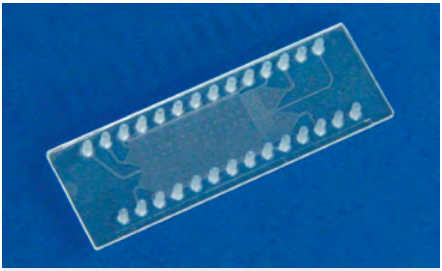


Fig. 159: Field flow fractionation chip Fluidic 159

Product Code	Lid Thickness [µm]	Material	Surface Treatment	Price [€/chip] 1+	10+	100+
14-1024-0159-03	175	PC	-	42.20	34.30	26.10
14-1025-0159-05	188	Zeonor	-	42.20	34.30	26.10
14-1026-0159-03	175	PC	hydrophilized	45.20	36.30	27.80
14-1027-0159-05	188	Zeonor	hydrophilized	45.20	36.30	27.80

3.9 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.

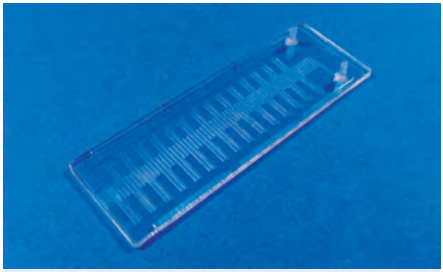


Fig. 160: 15-cycle chip Fluidic 47

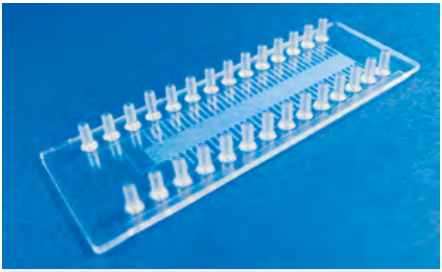


Fig. 161: 36-cycle chip Fluidic 65

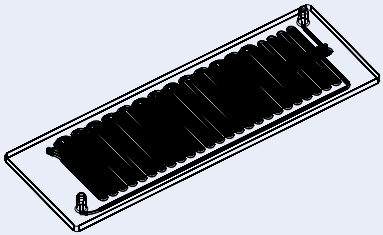


Fig. 162: Schematic drawing of 40 cycle continuous-flow PCR chip Fluidic 243

Fig. 163: 40 cycle continuous-flow PCR chip Fluidic 243

Product Code	Lid Thickness [µm]	Material	Comments Design Channel Dimensions Width / Depth / Length	Price [€/chip] 1+	10+	100+	1000+
08-0470-0047-03	250	PC	15 cycles (1 inlet, 1 outlet) 500 µm / 100 µm / 810 mm	42.50	32.50	25.50	12.00
08-0471-0065-03	250	PC	36 cycles (2 inlets, 3 outlets) 220 µm / 100 µm / 1,257 mm	42.50	32.50	25.50	12.00
08-0480-0708-02	125	Topas	41 cycles (1 inlet, 1 outlet) 200 µm / 100 µm / 1,879 mm	42.50	32.50	25.50	12.00
08-0479-0708-03	250	PC	41 cycles (1 inlet, 1 outlet) 200 µm / 100 µm / 1,879 mm	42.50	32.50	25.50	12.00
08-0473-0243-03	250	PC	40 cycles (1 inlet, 1 outlet) 600 µm / 300 µm / 1,637 mm	42.50	32.50	25.50	12.00
08-0474-0243-05	188	Zeonor	40 cycles (1 inlet, 1 outlet) 600 µm / 300 µm / 1,637 mm	42.50	32.50	25.50	12.00

3.10 Titer plates – 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.

3.10.1 Nanotiter plate – Microscopy slide format

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. 164: Nanotiter plate Fluidic 18

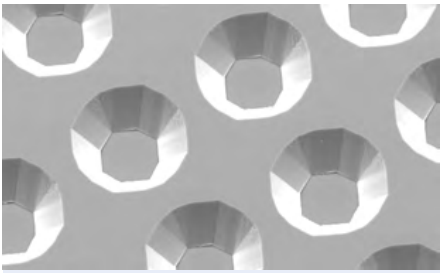


Fig. 165: Nanotiter plate – well detail

Product Code	Well Depth	Well Size [µm] Structure 1		2		3		Well Spacing [µm] Structure 1	2	3	Mate-rial	Price [€/chip] 1+	10+	50+	100+	500+
	[µm]	Top	Bot.	Top	Bot.	Top	Bot.									
05-0133-0018-01	20	124	96	224	196	424	396	281.25	562.5	1125	PMMA	40.00	30.00	9.00	7.00	5.20
05-0134-0018-02	20	124	96	224	196	424	396	281.25	562.5	1125	Topas	45.00	35.00	14.00	8.00	5.40
05-0137-0018-03	20	124	96	224	196	424	396	281.25	562.5	1125	PC	40.00	30.00	9.00	7.00	5.20
05-0138-0018-05	20	124	96	224	196	424	396	281.25	562.5	1125	Zeonor	45.00	35.00	14.00	8.00	5.40
05-0139-0018-04	20	124	96	224	196	424	396	281.25	562.5	1125	Zeonex	45.00	35.00	14.00	8.00	5.40

3.10.2 18-well titer plate – Microscopy slide format

The 18-well titer plate (119 µl/well) works with 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.

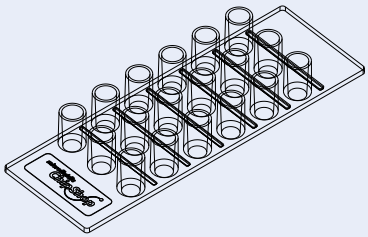


Fig. 166: Schematic drawing of the 18-well titer plate Fluidic 141

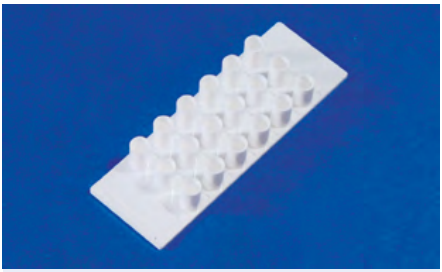


Fig. 167: 18-well microtiter-plate

Product Code	Well Volume [µl]	Material	Price [€/chip] 1+	10+	100+
05-0950-0141-05	119	Zeonor	20.00	15.00	5.40
05-0951-0141-05.2	119	Zeonor, white	20.00	15.00	5.40

3.10.3 65-well chip – microscopy slide format

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.

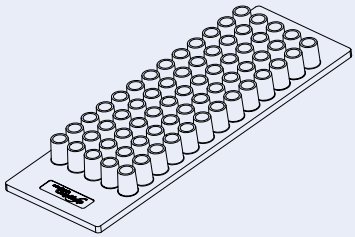


Fig. 168: 65-well chip Fluidic 383 – microscopy slide format

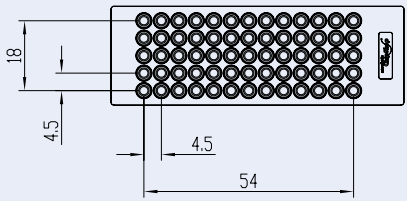


Fig. 169: Details 65-well chip Fluidic 383

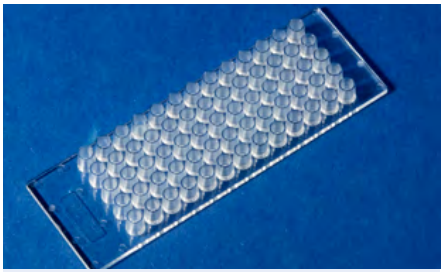


Fig. 170: 65-well chip Fluidic 383

Fig. 171: 65-well chip used as source plate in spotter

Product Code	Well Volume [µl]	Material	Price [€/chip] 1+	10+	100+
05-0952-0383-05	25	Zeonor	20.00	15.20	5.45
05-0953-0383-09	25	PP	20.00	15.20	5.45

3.11 Membrane chips

One application of the membrane chips is the generation of plasma from whole blood. While this application is rather prominent, these chips can be used for various filtering application 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 ask our team at *sales@microfluidic-ChipShop.com* by indicating your application and special needs.

3.11.1 Plasma generation chips

Microscopy slide chips with 2 and 4 membranes are at hand to ensure the plasma generation out of full blood.

For the chips with 10 mm diameter membranes, each membrane can generate roughly 12 – 15 μl plasma out of 25 μl full blood. Each unit of these chips consists of a 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 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.

Upon request, the platform can be equipped with customer-specific membranes. Please contact us for feasibility and pricing.

3.11.1.1 Plasma/serum generation chips – 10 mm diameter membrane

Fig. 172: Plasma/serum generation chip Fluidic 168

Fig. 173: Close-up of one plasma/serum generation unit

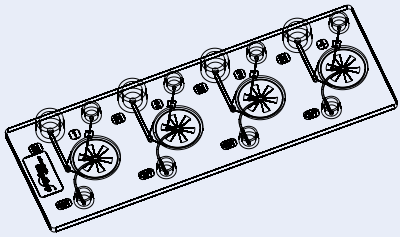


Fig. 174: Schematic drawing of membrane chip Fluidic 168

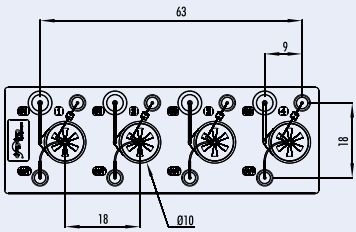


Fig. 175: Detail of membrane chip Fluidic 168

Product Code	Description	Surface Treatment	Material	Price [€/chip] 1+	10+	100+
15-1503-0168-02	Chip with 4 plasma generation membranes	-	Topas	79.50	63.50	42.50
15-1550-0168-02	Chip with 4 plasma generation membranes	hydrophilized	Topas	89.50	69.40	47.10

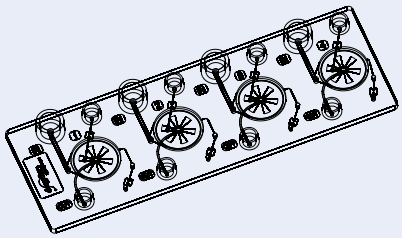


Fig. 176: Schematic drawing of membrane chip Fluidic 200

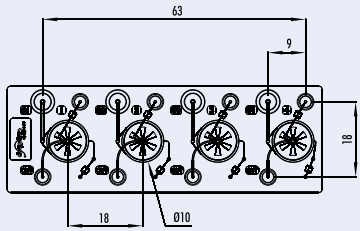


Fig. 177: Detail of membrane chip Fluidic 200

Product Code	Description	Surface Treatment	Material	Price [€/chip] 1+	10+	100+
15-1504-0200-02	Chip with 4 plasma generation membranes	-	Topas	79.50	63.50	42.50
15-1551-0200-07	Chip with 4 plasma generation membranes	-	PS	79.50	63.50	42.50
15-1552-0200-02	Chip with 4 plasma generation membranes	hydrophilized	Topas	89.50	69.40	47.10
15-1553-0200-07	Chip with 4 plasma generation membranes	hydrophilized	PS	89.50	69.40	47.10

3.11.1.2 Plasma/serum generation chips – High capacity membrane chips

Due to a massively enlarged footprint of the membrane, these chips allow for the generation of larger volumes of plasma/serum. Depending on the blood sample achievable volumes range from 20 – 35 μl.

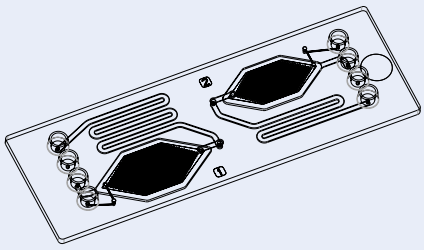


Fig. 178: Schematic drawing of membrane chip Fluidic 535

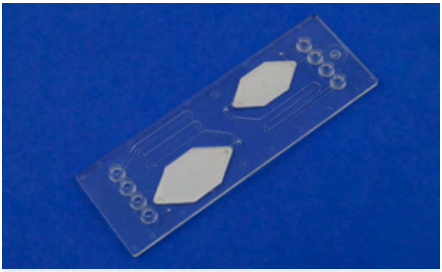


Fig. 179: Membrane chip Fluidic 535

Product Code	Description	Lid Thickness [µm]	Material	Surface Treatment	Price [€/chip] 1+	10+	100+
15-1507-0535-02	Membrane chip with 2 membrane generation units – Fluidic 535	140	Topas	-	79.50	63.50	42.50
15-1508-0535-07	Membrane chip with 2 membrane generation units – Fluidic 535	125	PS	-	79.50	63.50	42.50
15-1509-0535-02	Membrane chip with 2 membrane generation units – Fluidic 535	140	Topas	hydrophilized	89.50	69.40	47.10
15-1522-0535-07	Membrane chip with 2 membrane generation units – Fluidic 535	125	PS	hydrophilized	89.50	69.40	47.10

3.11.1.3 Plasma/serum generation chips

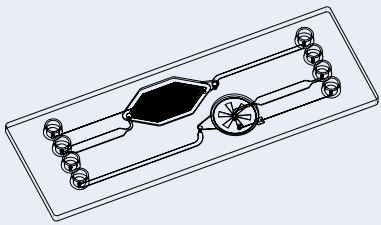


Fig. 180: Schematic drawing of membrane chip Fluidic 783

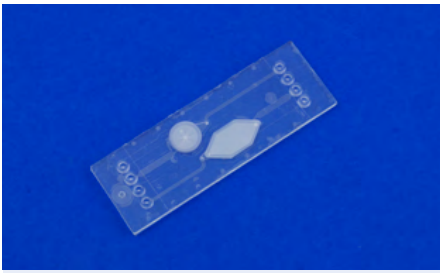


Fig. 181: Membrane chip Fluidic 783

Product Code	Description	Material	Surface Treatment	Price [€/chip] 1+	10+	100+
15-1558-0783-02	Plasma generation chip with two membranes – Fluidic 783	Topas	-	79.50	63.50	42.50
15-1559-0783-07	Plasma generation chip with two membranes – Fluidic 783	PS	-	79.50	63.50	42.50
15-1560-0783-02	Plasma generation chip with two membranes – Fluidic 783	Topas	hydrophilized	89.50	69.40	47.10
15-1561-0783-07	Plasma generation chip with two membranes – Fluidic 783	PS	hydrophilized	89.50	69.40	47.10

3.11.2 Transwell membrane chip

The transwell chips have been designed to allow direct access on membrane areas and provide a permanent entry port for liquid supply, storage and exchange. In combination with microfluidic ChipShop's specially designed Interaction Tanks like Fluidic 234 and 235 for liquid supply and storage this chip family allows for a wide variety of filtering and assay tasks in particular for cell-based assays. Interaction Tank Fluidic 235 is equipped with a cap that included Mini Luer fluidic interfaces to be easily connected to pumps for permanent operation.

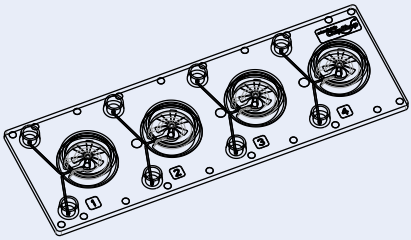


Fig. 182: Schematic drawing of transwell membrane chip Fluidic 219

Fig. 183: Transwell membrane chip Fluidic 219 with tank Fluidic 234 as fluid reservoir

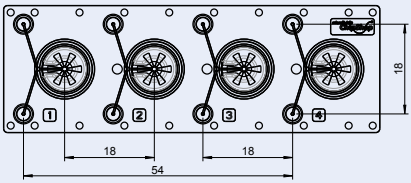


Fig. 184: Detail of transwell membrane chip Fluidic 219

Fig. 185: Transwell membrane chip Fluidic 219 with tank Fluidic 234 as fluid reservoir

Product Code	Description	Material	Surface Treatment	Price [€/chip] 1+	10+	100+
15-1578-0219-02	Transwell membrane chip Fluidic 219, 8 µm pore size membrane	Topas	-	79.50	63.50	42.50
15-1579-0219-07	Transwell membrane chip Fluidic 219, 8 µm pore size membrane	PS	-	79.50	63.50	42.50
15-1580-0219-02	Transwell membrane chip Fluidic 219, 8 µm pore size membrane	Topas	hydrophilized	89.50	69.40	47.10
15-1581-0219-07	Transwell membrane chip Fluidic 219, 8 µm pore size membrane	PS	hydrophilized	89.50	69.40	47.10

Product Code	Description	Material	Price [€/chip] 1+	10+	100+
16-0622-0234-09	Interaction tank – row of four tanks – 4.5 ml volume, Fluidic 234	PP	35.00	22.00	9.40
16-0623-0235-09	Interaction tank – row of four tanks – 4.5 ml volume, Fluidic 235 – with cap	PP	35.00	22.00	9.40

3.11.3 Cross-flow membrane chips

The cross-flow membrane chips have two in- and outlet ports above and below the membrane. This allows for experiments such as small molecule transfer measurements, on-chip dialysis or cell culture experiments. Upon request, the platform can be equipped with customer-specific membranes. Please contact us for feasibility and pricing.

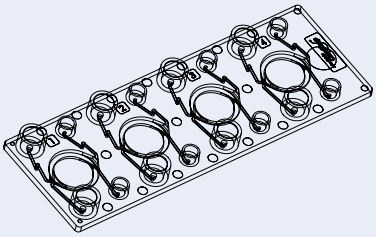


Fig. 186: Schematic drawing of cross-flow membrane chip Fluidic 398

Fig. 187: Cross-flow membrane chip Fluidic 398

Product Code	Description	Lid Thickness [µm]	Material	Price [€/chip]		
				1+	10+	100+
15-1505-0398-02	Cross-flow membrane chip Fluidic 398	140	Topas	79.50	63.50	42.50

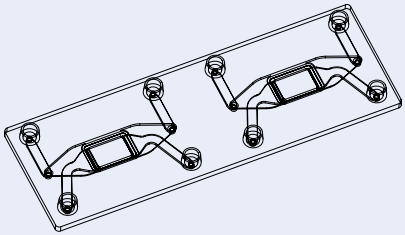


Fig. 188: Schematic drawing of cross-flow membrane chip Fluidic 480

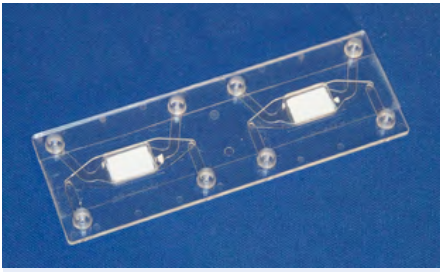


Fig. 189: Cross-flow membrane chip Fluidic 480

Product Code	Description	Lid Thickness [µm]	Material	Surface Treatment	Price [€/chip] 1+	10+	100+
15-1506-0480-02	Cross-flow membrane chip Fluidic 480, 8 µm pore size	140	Topas	-	79.50	63.50	42.50
15-1523-0480-07	Cross-flow membrane chip Fluidic 480, 8 µm pore size	125	PS	-	79.50	63.50	42.50
15-1526-0480-02	Cross-flow membrane chip Fluidic 480, 0.2 µm pore size	140	Topas	-	79.50	63.50	42.50
15-1527-0480-07	Cross-flow membrane chip Fluidic 480, 0.2 µm pore size	125	PS	-	79.50	63.50	42.50
15-1524-0480-02	Cross-flow membrane chip Fluidic 480, 8 µm pore size	140	Topas	hydrophilized	89.50	69.40	47.10
15-1525-0480-07	Cross-flow membrane chip Fluidic 480, 8 µm pore size	125	PS	hydrophilized	89.50	69.40	47.10
15-1528-0480-02	Cross-flow membrane chip Fluidic 480, 0.2 µm pore size	140	Topas	hydrophilized	89.50	69.40	47.10
15-1529-0480-07	Cross-flow membrane chip Fluidic 480, 0.2 µm pore size	125	PS	hydrophilized	89.50	69.40	47.10

Fig. 190: : Cross-Flow membrane chip Fluidic 653 with additional in- and outlet channels

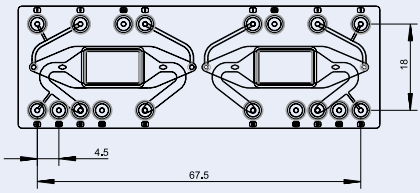


Fig. 191: Schematic drawing of Cross-Flow membrane chip Fluidic 653 with additional in- and outlet channels

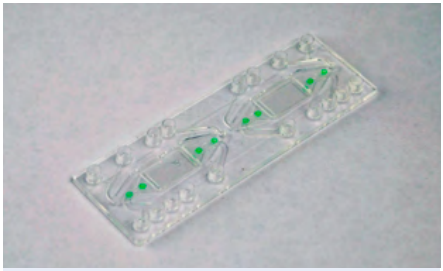


Fig. 192: Cross-Flow membrane chip Fluidic 653 with integrated oxygen sensor spots

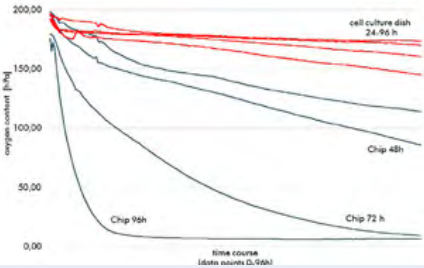


Fig. 193: Comparison of oxygen consumption in a cell culture dish vs microfluidic chip measured with integrated oxygen sensor spots. The curves show the oxygen concentration over 24 h intervals.

Product Code	Description	Lid Thickness [µm]	Material	Surface Treatment	Price [€/chip] 1+	10+	100+
15-1530-0653-02	Cross-flow membrane chip Fluidic 653, 8 µm pore size	140	Topas	-	79.50	63.50	42.50
15-1531-0653-07	Cross-flow membrane chip Fluidic 653, 8 µm pore size	125	PS	-	79.50	63.50	42.50
15-1534-0653-02	Cross-flow membrane chip Fluidic 653, 3 µm pore size	140	Topas	-	79.50	63.50	42.50
15-1535-0653-07	Cross-flow membrane chip Fluidic 653, 3 µm pore size	125	PS	-	79.50	63.50	42.50
15-1532-0653-02	Cross-flow membrane chip Fluidic 653, 8 µm pore size	140	Topas	hydrophilized	89.50	69.40	47.10
15-1533-0653-07	Cross-flow membrane chip Fluidic 653, 8 µm pore size	125	PS	hydrophilized	89.50	69.40	47.10
15-1536-0653-02	Cross-flow membrane chip Fluidic 653, 3 µm pore size	140	Topas	hydrophilized	89.50	69.40	47.10
15-1537-0653-07	Cross-flow membrane chip Fluidic 653, 3 µm pore size	125	PS	hydrophilized	89.50	69.40	47.10
15-1538-0653-02	Cross-flow membrane chip Fluidic 653, 8 µm pore size, open top for membrane access	140	Topas	hydrophilized	89.50	69.40	47.10
15-1539-0653-07	Cross-flow membrane chip Fluidic 653, 8 µm pore size, open top for membrane access	125	PS	hydrophilized	89.50	69.40	47.10
15-1540-0653-02	Cross-flow membrane chip Fluidic 653, 3 µm pore size, integrated oxygen sensor spots	140	Topas	hydrophilized	118.00	97.50	68.10
15-1541-0653-07	Cross-flow membrane chip Fluidic 653, 3 µm pore size, integrated oxygen sensor spots	125	PS	hydrophilized	118.00	97.50	68.10

Fig. 194: Cross-Flow membrane chip Fluidic 694 with additional in- and outlet channels

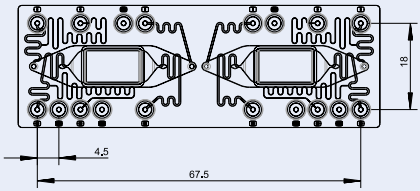


Fig. 195: Schematic drawing of Cross-Flow membrane chip Fluidic 694 with additional in- and outlet channels

Product Code	Description	Lid Thickness [µm]	Material	Surface Treatment	Price [€/chip] 1+	10+	100+
15-1542-0694-05	Cross-flow membrane chip Fluidic 694, 8 µm pore size	188	Zeonor	-	79.50	63.50	42.50
15-1543-0694-07	Cross-flow membrane chip Fluidic 694, 8 µm pore size	125	PS	-	79.50	63.50	42.50
15-1546-0694-05	Cross-flow membrane chip Fluidic 694, 3 µm pore size	188	Zeonor	-	79.50	63.50	42.50
15-1547-0694-07	Cross-flow membrane chip Fluidic 694, 3 µm pore size	125	PS	-	79.50	63.50	42.50
15-1544-0694-05	Cross-flow membrane chip Fluidic 694, 8 µm pore size	188	Zeonor	hydrophilized	89.50	69.40	47.10
15-1545-0694-07	Cross-flow membrane chip Fluidic 694, 8 µm pore size	125	PS	hydrophilized	89.50	69.40	47.10
15-1548-0694-05	Cross-flow membrane chip Fluidic 694, 3 µm pore size	188	Zeonor	hydrophilized	89.50	69.40	47.10
15-1549-0694-07	Cross-flow membrane chip Fluidic 694, 3 µm pore size	125	PS	hydrophilized	89.50	69.40	47.10

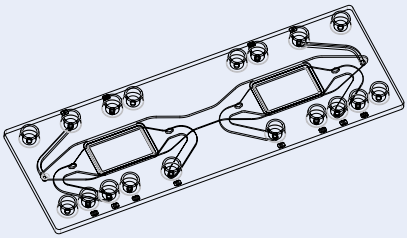


Fig. 196: Schematic drawing of cross-flow membrane chip Fluidic 747

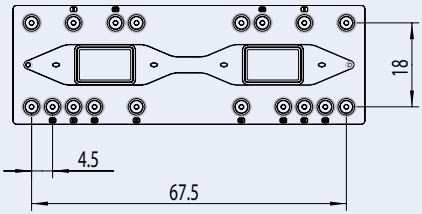


Fig. 197: Cross-flow membrane chip Fluidic 747

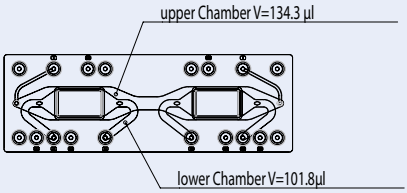


Fig. 198: Cross-flow membrane chip Fluidic 747 - Volumes

Fig. 199: Cross-flow membrane chip Fluidic 747

Product Code	Description	Material	Surface Treatment	Price [€/chip] 1+	10+	100+
15-1554-0747-02	Cross-flow membrane chip Fluidic 747, 8 µm pore size	Topas	-	79.50	63.50	42.50
15-1555-0747-07	Cross-flow membrane chip Fluidic 747, 8 µm pore size	PS	-	79.50	63.50	42.50
15-1556-0747-02	Cross-flow membrane chip Fluidic 747, 8 µm pore size	Topas	hydrophilized	89.50	69.40	47.10
15-1557-0747-07	Cross-flow membrane chip Fluidic 747, 8 µm pore size	PS	hydrophilized	89.50	69.40	47.10

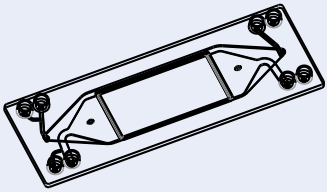


Fig. 200: Cross-flow membrane chip Fluidic 846

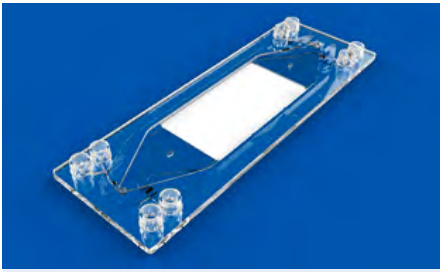


Fig. 201: Cross-flow membrane chip Fluidic 846 - Volumes

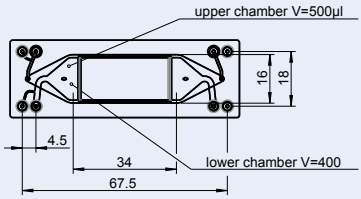


Fig. 202: Cross-flow membrane chip Fluidic 846

Product Code	Description	Material	Surface Treatment	Price [€/chip] 1+	10+	100+
15-1562-0846-02	Cross-flow membrane chip Fluidic 846, 8 µm pore size	Topas	-	79.50	63.50	42.50
15-1563-0846-07	Cross-flow membrane chip Fluidic 846, 8 µm pore size	PS	-	79.50	63.50	42.50
15-1564-0846-02	Cross-flow membrane chip Fluidic 846, 8 µm pore size	Topas	hydrophilized	89.50	69.40	47.10
15-1565-0846-07	Cross-flow membrane chip Fluidic 846, 8 µm pore size	PS	hydrophilized	89.50	69.40	47.10

3.11.4 Cross-flow membrane chips with Luer and Mini Luer interface

The cross-flow membrane chips with Luer and Mini Luer interface give the option to connect a fluidic reservoir on the Luer interface.

A special Pipette-Chip-Bridge combines the 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.

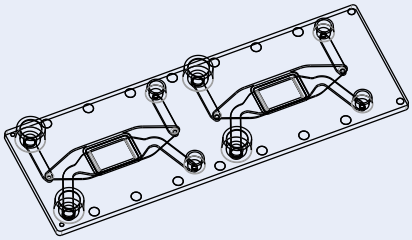


Fig. 203: Cross-flow membrane chip Fluidic 568

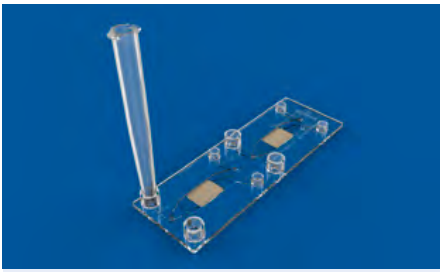


Fig. 204: Pipette-Chip-Bridge (Fluidic 569) mounted on Luer interface of the cross-flow membrane chip Fluidic 568

Product Code	Description	Material	Surface Treatment	Price [€/chip] 1+	10+	100+
15-1580-0568-02	Cross-flow membrane chip Fluidic 568, 8 µm pore size	Topas	-	79.50	63.50	42.50
15-1581-0568-07	Cross-flow membrane chip Fluidic 568, 8 µm pore size	PS	-	79.50	63.50	42.50
15-1582-0568-02	Cross-flow membrane chip Fluidic 568, 8 µm pore size	Topas	hydrophilized	89.50	69.40	47.10
15-1583-0568-07	Cross-flow membrane chip Fluidic 568, 8 µm pore size	PS	hydrophilized	89.50	69.40	47.10

Product Code	Description	Material	Price [€/unit] 1+	3+	10+
16-0634-0569-09	Pipette-Chip-Bridge, Fluidic 569	PP	25.00	10.20	5.40

3.12 Weir-filter chips

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

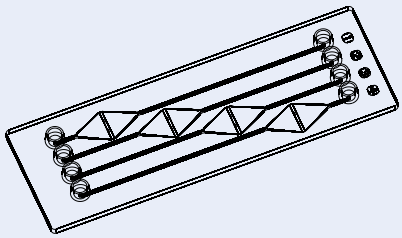


Fig. 205: Schematic drawing of weir chip Fluidic 220

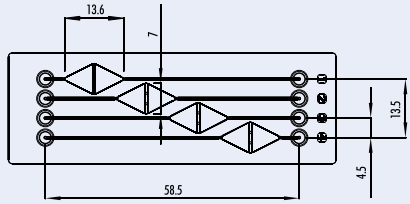


Fig. 206: Detail of weir chip Fluidic 220

Product Code	Slit width /height [mm]	[µm]	Lid Thickness [µm]	Channel Depth [µm]	Channel Width [µm]	Material	Surface Treat-ment	Price [€/chip] 1+	10+	100+
14-1030-0220-03	7	20 / 10 / 10 / 5	175	500	500	PC	-	42.20	34.30	26.10
14-1031-0220-05	7	20 / 10 / 10 / 5	188	500	500	Zeonor	-	42.20	34.30	26.10
14-1032-0220-02	7	20 / 10 / 10 / 5	140	500	500	Topas	-	42.20	34.30	26.10
14-1033-0220-03	7	20 / 10 / 10 / 5	175	500	500	PC	hydrophilized	45.20	36.30	27.80
14-1034-0220-05	7	20 / 10 / 10 / 5	188	500	500	Zeonor	hydrophilized	45.20	36.30	27.80
14-1029-0220-02	7	20 / 10 / 10 / 5	140	500	500	Topas	hydrophilized	45.20	36.30	27.80

3.13 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.

3.13.1 Passive mixer

3.13.1.1 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 (2.13.1.1, 2.13.1.3) or by adding structures to increase lateral velocity (2.13.1.2, 2.13.1.4). As there are multiple mixing structures on each chip, these can be daisy-chained to improve the mixing result.

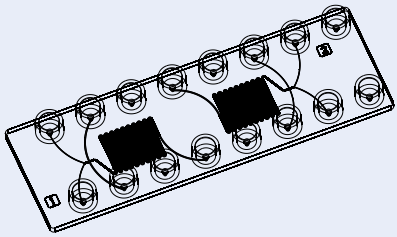


Fig. 207: Schematic drawing of diffusion mixer chip Fluidic 186

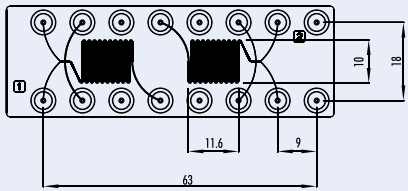


Fig. 208: Detail of diffusion mixer

Product Code	Lid Thickness [µm]	Channel Depth [µm]	Channel Width [µm]	Material	Price [€/chip]		
					1+	10+	100+
14-1035-0186-03	175	100	inlets 100 / 200 mixer 200 outlet 200	PC	42.20	31.50	19.30
14-1036-0186-05	188	100	intets 100 / 200 mixer 200 outlet 200	Zeonor	42.20	31.50	19.30

3.13.1.2 Passive mixer – Herringbone mixer

This mixer is based on the principle as described in: A.D. Stroock et al., Chaotic Mixer for Microchannels, Science, 295, 647-651, 2002.

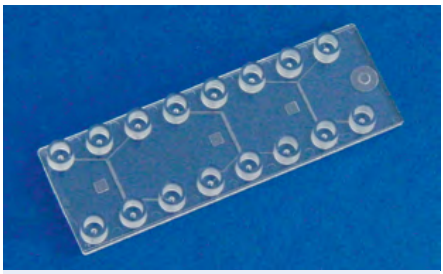


Fig. 209: Herringbone mixer chip Fluidic 187

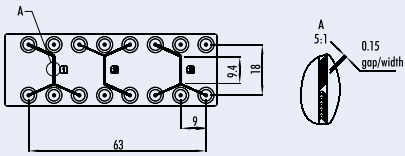


Fig. 210: Detail of herringbone mixer

Product Code	Lid Thickness [µm]	Channel Depth [µm]	Channel Width [µm]	Material	Price [€/chip] 1+	10+	100+
14-1037-0187-03	175	200	inlet 300 mixer 600 outlet 600	PC	42.20	31.50	19.30
14-1038-0187-05	188	200	inlet 300 mixer 600 outlet 600	Zeonor	42.20	31.50	19.30

3.13.1.3 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.

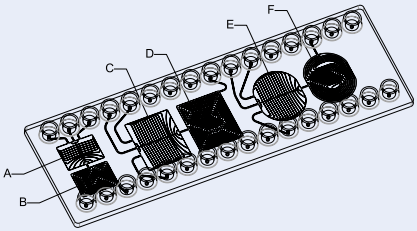


Fig. 211: Schematic drawing of phase guide mixer chip Fluidic 533

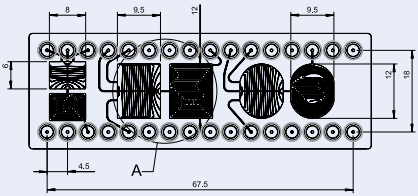


Fig. 212: Phase guide mixer chip Fluidic 533

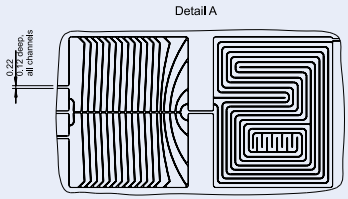


Fig. 213: Detail drawing of phase guide mixer chip Fluidic 533

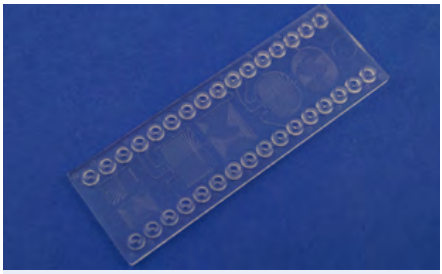


Fig. 214: Phase guide mixer chip Fluidic 533

Product Code	Description	Chamber volumes	Lid Thickness [µm]	Surface Treatment	Material	Price [€/chip] 1+	10+	100+
14-1041-0533-02	Phase guide mixer chip – Fluidic 533	A & B: 5.6 µl C & D: 13.2 µl E & F: 11.1 µl	140	-	Topas	42.20	31.50	19.30
14-1042-0533-02	Phase guide mixer chip – Fluidic 533	A & B: 5.6 µl C & D: 13.2 µl E & F: 11.1 µl	140	hydrophilized	Topas	46.20	34.70	21.40

3.13.1.4 Passive mixer – Micro vortex mixer

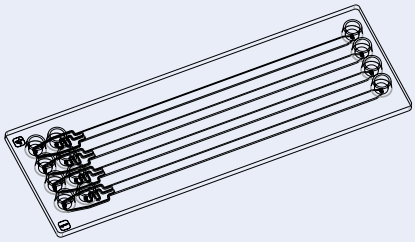


Fig. 215: Schematic drawing of the micro vortex mixer Fluidic 640

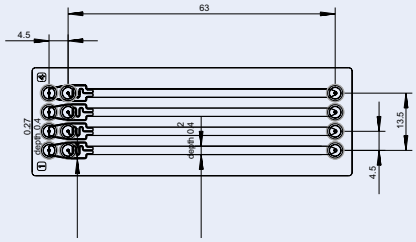


Fig. 216: Micro vortex mixer Fluidic 640

Product Code	Description	Lid Thickness [µm]	Material	Price [€/chip] 1+	10+	100+
14-1443-0640-01	Micro vortex mixer – Fluidic 640	175	PMMA	42.20	31.50	19.30
14-1444-0640-02	Micro vortex mixer – Fluidic 640	140	Topas	42.20	31.50	19.30
14-1445-0640-03	Micro vortex mixer – Fluidic 640	175	PC	42.20	31.50	19.30
14-1452-0640-01	Micro vortex mixer -- Fluidic 640 - hydrophilized	175	PMMA	46.20	34.70	21.40
14-1453-0640-02	Micro vortex mixer -- Fluidic 640 - hydrophilized	140	Topas	46.20	34.70	21.40
14-1454-0640-03	Micro vortex mixer -- Fluidic 640 - hydrophilized	175	PC	46.20	34.70	21.40

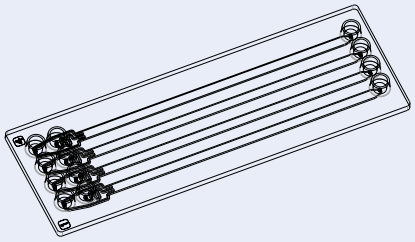


Fig. 217: Schematic drawing of the micro vortex mixer Fluidic 641

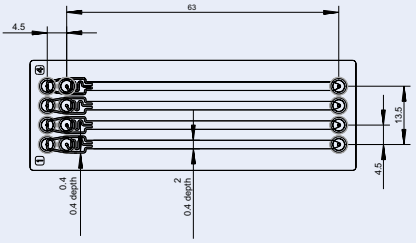


Fig. 218: Micro vortex mixer Fluidic 641

Product Code	Description	Lid Thickness [µm]	Material	Price [€/chip] 1+	10+	100+
14-1446-0641-01	Micro vortex mixer – Fluidic 641	175	PMMA	42.20	31.50	19.30
14-1447-0641-02	Micro vortex mixer – Fluidic 641	140	Topas	42.20	31.50	19.30
14-1448-0641-03	Micro vortex mixer – Fluidic 641	175	PC	42.20	31.50	19.30
14-1455-0641-01	Micro vortex mixer -- Fluidic 641 - hydrophilized	175	PMMA	46.20	34.70	21.40
14-1456-0641-02	Micro vortex mixer -- Fluidic 641 - hydrophilized	140	Topas	46.20	34.70	21.40
14-1457-0641-03	Micro vortex mixer -- Fluidic 641 - hydrophilized	175	PC	46.20	34.70	21.40

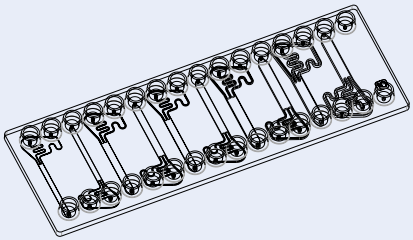


Fig. 219: Schematic drawing of the micro vortex mixer Fluidic 642

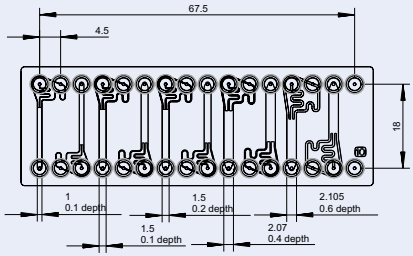


Fig. 220: Micro vortex mixer Fluidic 642

Product Code	Description	Lid Thickness [µm]	Material	Price [€/chip] 1+	10+	100+
14-1449-0642-01	Micro vortex mixer – Fluidic 642	175	PMMA	42.20	31.50	19.30
14-1450-0642-02	Micro vortex mixer – Fluidic 642	140	Topas	42.20	31.50	19.30
14-1451-0642-03	Micro vortex mixer – Fluidic 642	175	PC	42.20	31.50	19.30
14-1458-0642-01	Micro vortex mixer -- Fluidic 642 - hydrophilized	175	PMMA	46.20	34.70	21.40
14-1459-0642-02	Micro vortex mixer -- Fluidic 642 - hydrophilized	140	Topas	46.20	34.70	21.40
14-1460-0642-03	Micro vortex mixer -- Fluidic 642 - hydrophilized	175	PC	46.20	34.70	21.40

3.13.1.5 Passive mixer – Pearl chain mixer

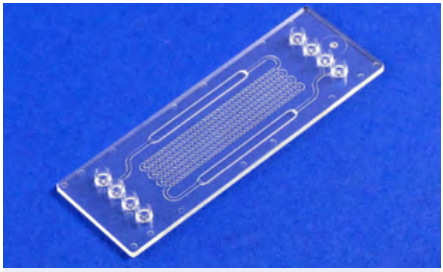


Fig. 221: Pearl-chain mixer Fluidic 658

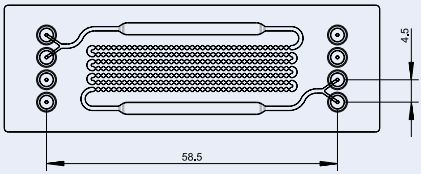


Fig. 222: Schematic drawing of pearl-chain mixer Fluidic 658

Product Code	Description	Lid Thickness [µm]	Material	Price [€/chip] 1+	10+	100+
14-1043-0658-02	Pearl-chain mixer Fluidic 658	125	Topas	42.20	34.30	26.10
14-1044-0658-03	Pearl-chain mixer Fluidic 658	175	PC	46.20	34.30	26.10

3.13.2 Active mixer – Stir bar actuated mixer

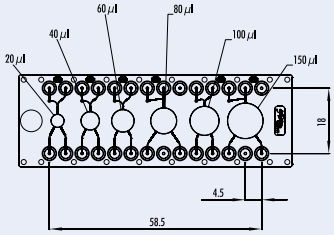


Fig. 223: Drawing of micro mixer chip with mixing chambers Fluidic 286

Fig. 224: Micro mixer with stir bars for active mixing

Product Code	Chamber volume [µl]	[µl]	[µl]	[µl]	[µl]	[µl]	Chamber depth [mm]	Lid Thickness [µm]	Material	Price [€/chip] 1+	10+
14-1039-0286-01	20	40	60	80	100	150	1.5	175	PMMA	82.50	63.50
14-1040-0286-05	20	40	60	80	100	150	1.5	188	Zeonor	82.50	63.50

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

3.14.1 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.

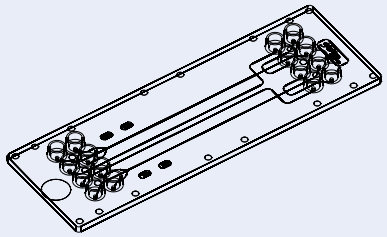


Fig. 225: Schematic drawing of cell sorting chip Fluidic 283

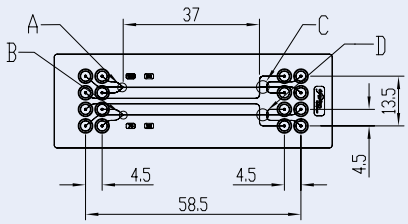


Fig. 226: Detail of cell sorting chip Fluidic 283

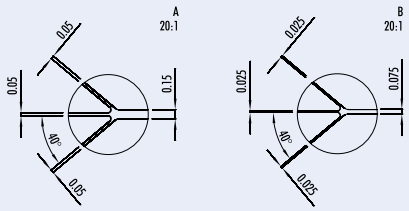


Fig. 227: Details of both entrance structures of cell sorting chip Fluidic 283

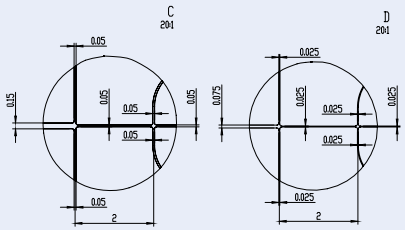


Fig. 228: Details of both outlet structures of cell sorting chip Fluidic 283

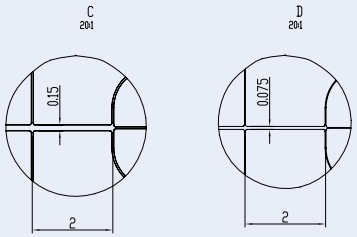


Fig. 229: Details of both outlet structures of cell sorting chip Fluidic 380 – only difference to chip Fluidic 283

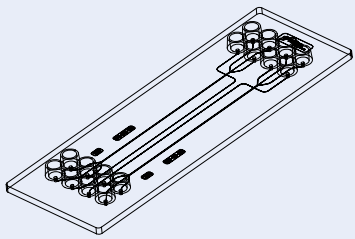


Fig. 230: Schematic drawing of cell sorting chip Fluidic 381

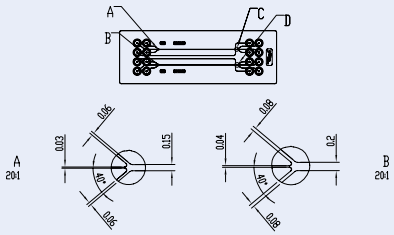


Fig. 231: Details of both inlet structures of cell sorting chip Fluidic 381

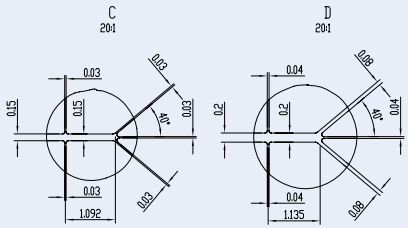


Fig. 232: Details of both outlet structures of cell sorting chip Fluidic 381 – only difference to chip Fluidic 283

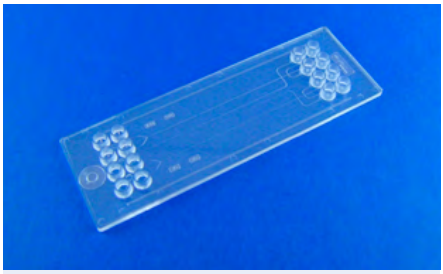


Fig. 233: Cell sorting chip Fluidic 283

Product Code	Channel Depth Structure 1 [µm]	Channel Depth Structure 2 [µm]	Cover Lid Thickness [µm]	Material	Price [€/chip] 1+	10+	30+
18-1700-0283-01	50	25	175	PMMA	42.20	34.30	26.10
18-1701-0283-05	50	25	188	Zeonor	42.20	34.30	26.10
18-1702-0380-01	50	25	175	PMMA	42.20	34.30	26.10
18-1703-0380-05	50	25	188	Zeonor	42.20	34.30	26.10
18-1704-0381-01	30	30	175	PMMA	42.20	34.30	26.10
18-1705-0381-05	30	30	188	Zeonor	42.20	34.30	26.10

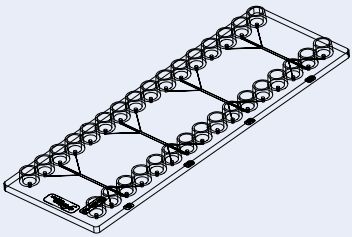


Fig. 234: Schematic drawing particle & cell sorter – Fluidic 386

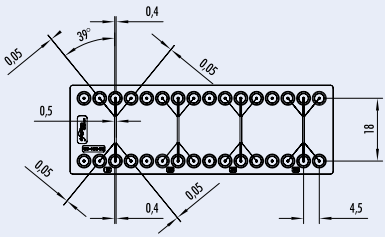


Fig. 235: Details particle & cell sorter – Fluidic 386

Product Code	Channel Depth Structure 1 [µm]	Structure 2 [µm]	Structure 3 [µm]	Structure 4 [µm]	Lid Thickness [µm]	Material	Price [€/chip] 1+	10+	30+
18-1706-0386-01	10	20	30	50	175	PMMA	42.20	34.30	26.10
18-1707-0386-05	10	20	30	50	188	Zeonor	42.20	34.30	26.10

3.14.2 Particle & cell sorting chips – Spiral sorter

Spirales can be used to separate particles according to their size due to the so-called Dean forces. Channel dimension, number of spirales 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

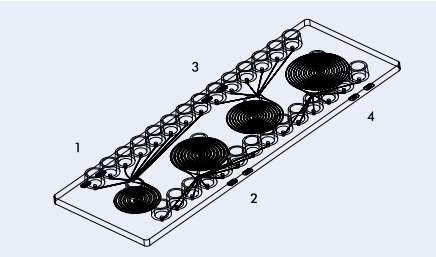


Fig. 236: Schematic drawing of the spirale sorter – Fluidic 382

Fig. 237: Spiral sorter – Fluidic 382

Product Code	Lid Thickness [µm]	Material	Price [€/chip] 1+	10+	100+
18-1708-0382-01	175	PMMA	42.20	34.30	26.10
18-1709-0382-05	188	Zeonor	42.20	34.30	26.10

3.15 Pillar chips

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.

3.15.1 Pillar chip – Complete cavities filled with pillars

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

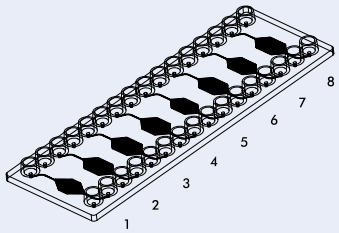


Fig. 238: Schematic drawing of pillar chip – Fluidic 261

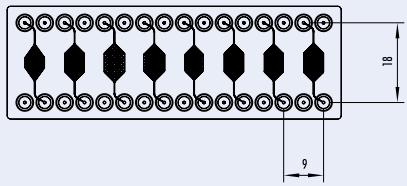


Fig. 239: Detail of pillar chip – Fluidic 261

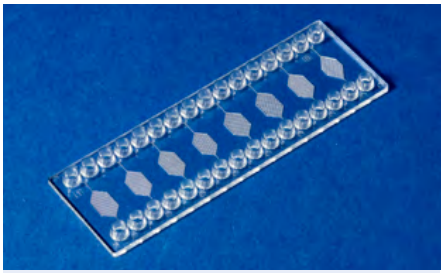


Fig. 240: Pillar chip – Fluidic 261

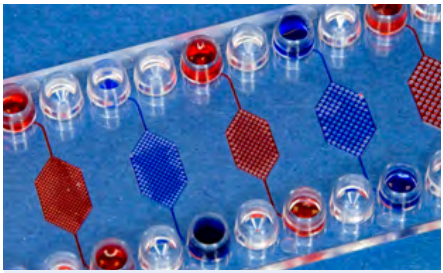


Fig. 241: Pillar chip filled – Fluidic 261

Product Code	Lid Thickness [µm]	Pillar No./diameter [µm]/ distance [µm]/depth	Material	Price [€/chip]		
				1+	10+	100+
19-1800-0261-01	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
19-1801-0261-05	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

3.16 Turning valve chips

Turning valves embedded on microfluidic chip 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. They can be operated either manually with a little valve actuator or mechanically with *microfluidic ChipShop's* latest ChipGenie® edition TV. Please see page 124 for the turning valves and page 153 chapter 8.8 for the ChipGenie® edition TV.

3.16.1 Turning valve test chips

These chips allow for the evaluation of metering on chip and in the valve body with the help of the turning valve and for the directing of liquids on chip.

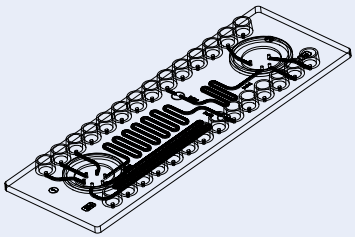


Fig. 242: Schematic drawing of turning valve test chip Fluidic 155

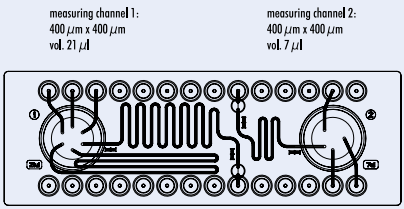


Fig. 243: Detail of turning valve test chip

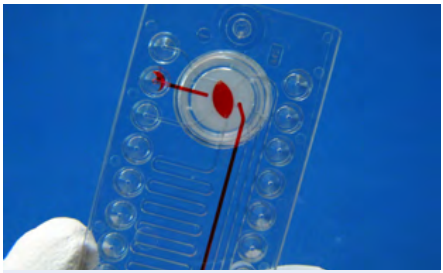


Fig. 244: Rotary valve with metering function

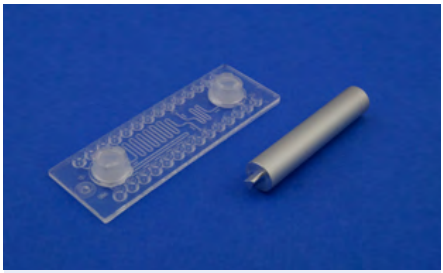


Fig. 245: Turning valve test chip with manual turning valve actuator

Product Code	Lid Thickness [µm]	Material	Price [€] 1+	10+
19-1850-0155-03	175	PC	128.50	79.60
19-1851-0155-05	188	Zeonor	128.50	79.60

Product Code	Description	Price [€] 1
19-1852-0000-00	Manual turning valve actuator	36.50

3.17 Blister test chips

The blister test chips are intended to evaluate liquid storage in blister pouches on chip. These chips can be obtained with and without blisters. Blisters are mounted on these chips with double sided adhesive tape that comes with the blister test chips.
Standard blisters are filled with dyed water and are available in different volumes. Please see page 145 for the blister pouches and page 176 chapter 10.5 for the ChipGenie® edition BD.

3.17.1 Blister test chips

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.

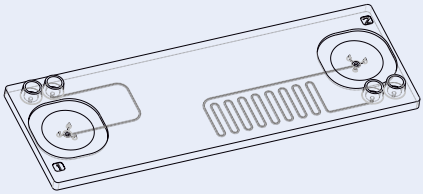


Fig. 246: Schematic drawing of blister test chip Fluidic 0289

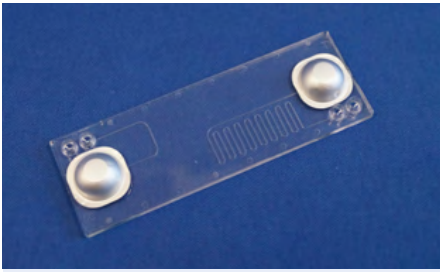


Fig. 247: Blister test chip Fluidic 0289

Product Code	Description	Blister volume [µl]	Lid thickness [µm]	Surface treatment	Material	Price [€/chip] 1+	10+	100+
23-1908-0289-02	Blister test chip – Fluidic 0289	2 x 100	140	-	Topas	84.20	42.50	28.90
23-1909-0289-02	Blister test chip – Fluidic 0289	2 x 150	140	-	Topas	84.20	42.50	28.90
23-1910-0289-02	Blister test chip – Fluidic 0289	2 x 200	140	-	Topas	84.20	42.50	28.90
23-1911-0289-02	Blister test chip – Fluidic 0289	2 x 250	140	-	Topas	84.20	42.50	28.90
23-1912-0289-02	Blister test chip – Fluidic 0289	2 x 100	140	hydrophilized	Topas	87.20	45.50	31.90
23-1913-0289-02	Blister test chip – Fluidic 0289	2 x 150	140	hydrophilized	Topas	87.20	45.50	31.90
23-1914-0289-02	Blister test chip – Fluidic 0289	2 x 200	140	hydrophilized	Topas	87.20	45.50	31.90
23-1915-0289-02	Blister test chip – Fluidic 0289	2 x 250	140	hydrophilized	Topas	87.20	45.50	31.90

3.17.2 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.

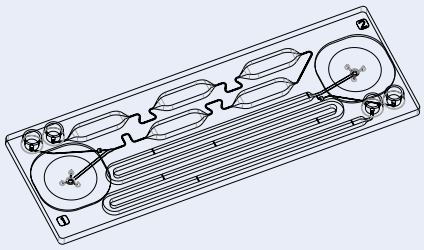


Fig. 248: Schematic drawing of blister test chip Fluidic 522

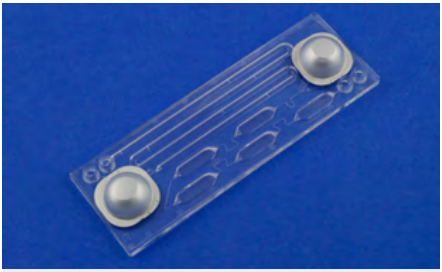


Fig. 249: Blister test chip Fluidic 522

Product Code	Description	Blister volume [µl]	Volume Measure-ment [µl]	Lid Thickness	Material	Surface treatment	Price [€/chip] 1+	10+	100+
23-1900-0522-02	Blister test chip – Fluidic 522	2x100	250	140	Topas	-	84.20	42.50	28.90
23-1901-0522-02	Blister test chip – Fluidic 522	2x 150	250	140	Topas	-	84.20	42.50	28.90
23-1902-0522-02	Blister test chip – Fluidic 522	2x 200	250	140	Topas	-	84.20	42.50	28.90
23-1903-0522-02	Blister test chip – Fluidic 522	2x 250	250	140	Topas	-	84.20	42.50	28.90
23-1904-0522-02	Blister test chip – Fluidic 522	2x 100	250	140	Topas	hydrophi-lized	87.20	45.50	31.90
23-1905-0522-02	Blister test chip – Fluidic 522	2x 150	250	140	Topas	hydrophi-lized	87.20	45.50	31.90
23-1906-0522-02	Blister test chip – Fluidic 522	2x 200	250	140	Topas	hydrophi-lized	87.20	45.50	31.90
23-1907-0522-02	Blister test chip – Fluidic 522	2x 250	250	140	Topas	hydrophi-lized	87.20	45.50	31.90

3.17.3 Blister test chip – Blister test chip – larger volume blisters

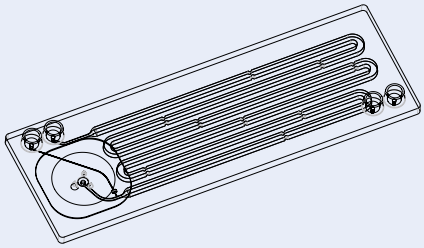


Fig. 250: Schematic drawing of blister test chip 761 – 500 µl blisters

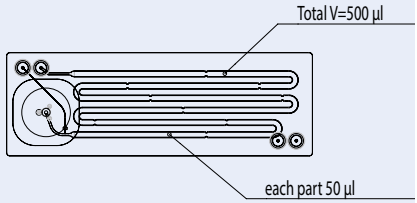


Fig. 251: Blister test chip fluidic 761 – 500 µl blisters

Product Code	Description	Blister volume [µl]	Lid Thickness	Material	Surface treatment	Price [€/chip] 1+	10+	100+
23-1925-0761-02	Blister test chip – Fluidic 761	500	140	Topas	-	64.80	34.60	22.15
23-1926-0761-02	Blister test chip – Fluidic 761	500	140	Topas	hydrophi-lized	67.80	37.60	25.15

3.17.4 Spare blisters

Blisters can be ordered as stand-alone parts being available with volumes ranging from 50 – 500 µl off-the shelf.

The blisters from 50 – 350 µl volume can be operated with blister test chips 0289 and 0522, the 500 µl blister requires different test chips.

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 either with dye or with individually defined liquids, to be provided to *microfluidic ChipShop*. Custom-filling services are charged 100 € extra per blister order.

Product Code	Description	Blister Volume [µl]	Price [€/10 blister] 1+	10+	100+
23-1916-0644-24	Blister pouch	50	8.20	5.80	2.95
23-1917-0645-24	Blister pouch	100	8.20	5.80	2.95
23-1918-0646-24	Blister pouch	150	8.20	5.80	2.95
23-1919-0647-24	Blister pouch	200	8.20	5.80	2.95
23-1920-0648-24	Blister pouch	250	8.20	5.80	2.95
23-1921-0649-24	Blister pouch	350	8.20	5.80	2.95
23-1922-0650-24	Blister pouch	500	8.20	5.80	2.95
23-1923-0000-00	Custom reagent filling service	-	100.00	-	-

3.17.5 Blister driver

For a quick evaluation of the emptying of blister and filling behavior, *microfluidic ChipShop's* blister driver ChipGenie® edition BD is at hand. The chips are inserted in the loader, the instrument positions the blisters correctly and a freely configurable emptying procedure can be performed. Visualization takes place with an integrated camera.

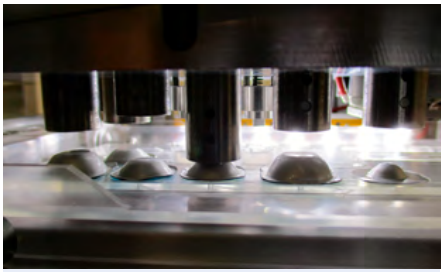


Fig. 252: Blister emptying in ChipGenie® edition BD

Product Code	Description	Price [€]
08-0497-0000-00	ChipGenie® edition BD – Blister Driver instrument	2.685,00

3.18 Cuvette chips

This chapter summarizes a variety of microfluidic chips for optical measurements. Several of these chips have within the measurement window different chamber depths 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.

3.18.1 Cuvette chip – Fluidic 527

Chip with eight parallel measurement cavities with three chamber depths.

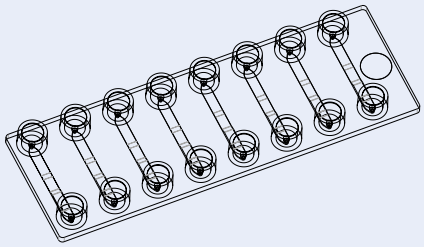


Fig. 253: Schematic drawing of cuvette chip – Fluidic 527

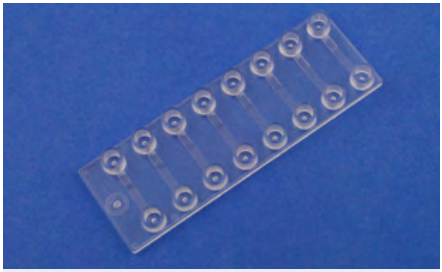


Fig. 254: Cuvette chip – Fluidic 527

Product Code	Description	Chamber-volume [µl]	Chamber depth [µm] Sec. 1	Sec. 2	Sec. 3	Lid Thickness [µm]	Surface treat-ment	Material	Price [€/chip] 1+	10+	100+
24-1950-0527-02	Cuvette chip – Fluidic 527	6,5	50	100	500	140	-	Topas	36.20	24.30	16.10
24-1951-0527-02	Cuvette chip – Fluidic 527	6,5	50	100	500	140	hydrophi-lized	Topas	39.20	26.30	17.80

3.18.2 Cuvette tank chip – Fluidic 553

Chip with larger sample uptake interface and measurement cavity with two chamber depths.

To avoid a 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.

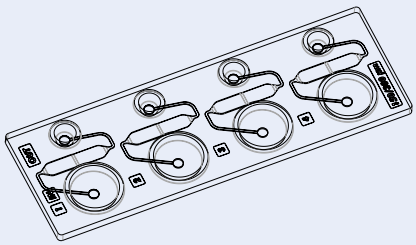


Fig. 255: Schematic drawing of cuvette tank chip – Fluidic 553

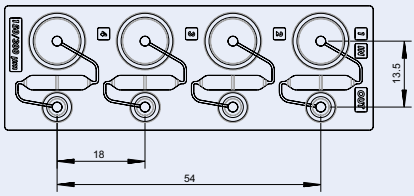


Fig. 256: Cuvette tank chip – Fluidic 553

Product Code	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+
24-1952-0553-02	Cuvette tank chip – Fluidic 553	6.75	150	300	140	-	-	Topas	36.20	24.30	16.10
24-1953-0553-02	Cuvette tank chip – Fluidic 553	6.75	150	300	140	-	Yes	Topas	46.20	31.20	20.10
24-1954-0553-02	Cuvette tank chip – Fluidic 553	6.75	150	300	140	Hydrophi-lized	-	Topas	39.20	26.30	17.80
24-1955-0553-02	Cuvette tank chip – Fluidic 553	6.75	150	300	140	Hydrophi-lized	Yes	Topas	49.20	33.20	21.90

3.18.3 Cuvette tank chip with incubation meander – Fluidic 576

Chip with larger sample uptake interface and measurement cavity with two chamber depths and reaction channel for prefilled reagents.

To avoid a 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.

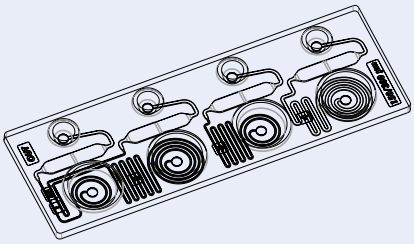


Fig. 257: Schematic drawing of cuvette tank chip with incubation meander – Fluidic 576

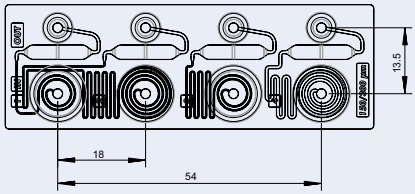


Fig. 258: Cuvette tank chip with incubation meander – Fluidic 576

Product Code	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+
24-1956-0576-02	Cuvette tank chip with incubation meander – Fluidic 576	6.75	150	300	140	-	-	Topas	36.20	24.30	16.10
24-1957-0576-02	Cuvette tank chip with incubation meander – Fluidic 576	6.75	150	300	140	-	Yes	Topas	46.20	31.20	20.10
24-1958-0576-02	Cuvette tank chip with incubation meander – Fluidic 576	6.75	150	300	140	hydrophi-lized	-	Topas	39.20	26.30	17.80
24-1959-0576-02	Cuvette tank chip with incubation meander – Fluidic 576	6.75	150	300	140	hydrophi-lized	Yes	Topas	49.20	33.20	21.90

3.19 Generic sensor platform

Frequently, one wants to evaluate the combination of microfluidics and sensors, e.g. silicon photonic or electrochemical sensors. This chip allows 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 chip comes with a double-sided adhesive tape gasket for sensor integration. Unless otherwise specified a rhombic-shaped cut-out of the adhesive tape for sensor integration is included in the chip package. Further examples are shown in the Fig.261 – Fig. 263.
The valve can be operated with the manual turning valve actuator (see page 87) or the ChipGenie TV instrument Chapter 10 (page 176).

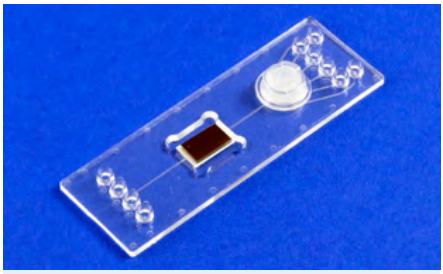


Fig. 259: Generic sensor platform Fluidic 673

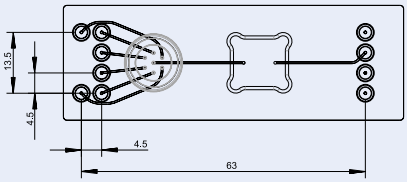


Fig. 260: Schematic drawing of generic sensor platform Fluidic 673

Product Code	Description	Material	Lid Thickness [μm]	Price [€/chip]		
				1+	10+	100+
14-1060-0673-01	Sensor platform Fluidic 673	PMMA	175	62.20	44.30	26.10
14-1061-0673-02	Sensor platform Fluidic 673	Topas	140	62.20	44.30	26.10
14-1062-0673-03	Sensor platform Fluidic 673	PC	175	62.20	44.30	26.10
14-1063-0673-05	Sensor platform Fluidic 673	Zeonor	188	62.20	44.30	26.10
14-1064-0673-07	Sensor platform Fluidic 673	PS	125	62.20	44.30	26.10

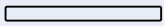


Fig. 261: Double sided adhesive tape gasket – straight channel

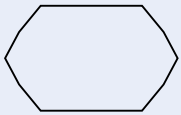


Fig. 262: Double sided adhesive tape gasket – rhombic chamber

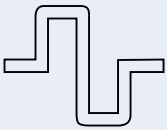


Fig. 263: Double sided adhesive tape gasket – curved channel

3.20 Interaction chips

The 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.

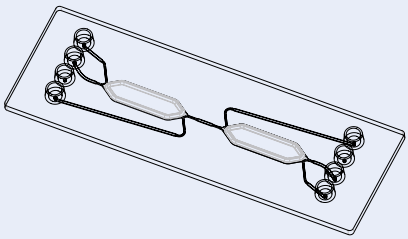


Fig. 264: Schematic drawing on interaction chip Fluidic 688

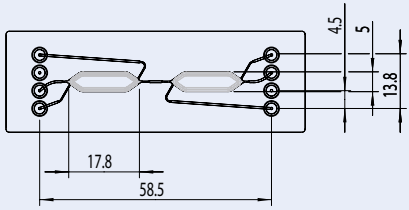


Fig. 265: Interaction chip Fluidic 688

Product Code	Chamber Volume [µl]	Chamber Depth [µm]	Lid Thickness [µm]	Material	Surface Treatment	Price [€/chip] 1+	10+	100+
27-1566-0688-02	37.8	400	140	Topas	-	36.20	24.30	16.10
27-1567-0688-07	37.8	400	125	PS	-	36.20	24.30	16.10
27-1568-0688-02	37.8	400	140	Topas	hydrophilized	39.20	26.30	17.80
27-1569-0688-07	37.8	400	125	PS	hydrophilized	39.20	26.30	17.80

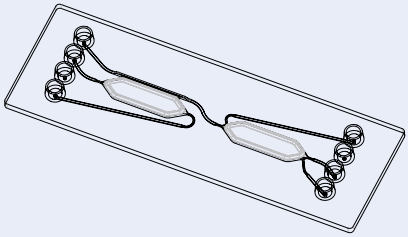


Fig. 266: Schematic drawing of interaction chip Fluidic 710

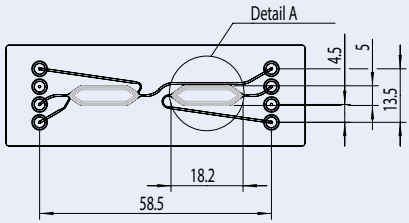


Fig. 267: Interaction chip Fluidic 710

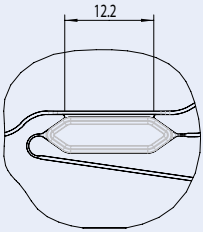


Fig. 268: Detail contact zone channel & cavity interaction chip Fluidic 710

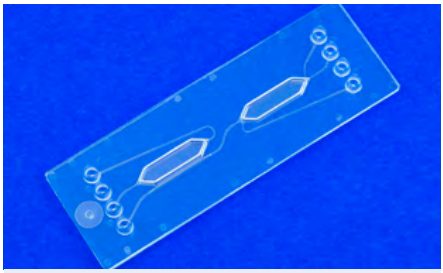


Fig. 269: Interaction chip Fluidic 710

Product Code	Chamber Volume [µl]	Chamber Depth [µm]	Lid Thickness [µm]	Material	Surface Treatment	Price [€/chip] 1+	10+	100+
27-1570-0710-02	53.1	600	140	Topas	-	36.20	24.30	16.10
27-1571-0710-07	53.1	600	125	PS	-	36.20	24.30	16.10
27-1572-0710-02	53.1	600	140	Topas	hydrophilized	39.20	26.30	17.80
27-1573-0710-07	53.1	600	125	PS	hydrophilized	39.20	26.30	17.80

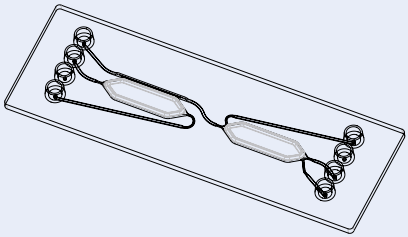


Fig. 270: Schematic drawing of interaction chip Fluidic 737

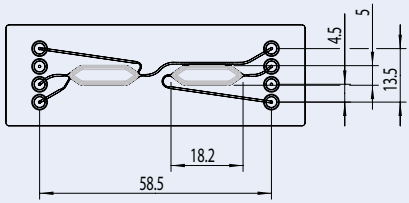


Fig. 271: Interaction chip Fluidic 737

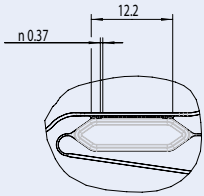


Fig. 272: Detail contact zone channel & cavity interaction chip Fluidic 737

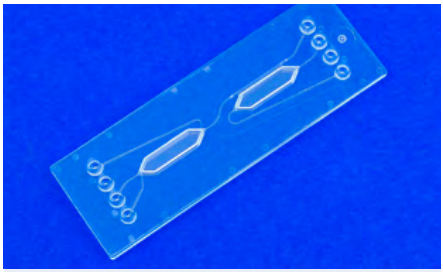


Fig. 273: Interaction chip Fluidic 737

Product Code	Chamber Volume [µl]	Chamber Depth [µm]	Lid Thickness [µm]	Material	Surface Treatment	Price [€/chip] 1+	10+	100+
27-1574-0737-02	53.1	600	140	Topas	-	36.20	24.30	16.10
27-1575-0737-07	53.1	600	125	PS	-	36.20	24.30	16.10
27-1576-0737-02	53.1	600	140	Topas	hydrophilized	39.20	26.30	17.80
27-1577-0737-07	53.1	600	125	PS	hydrophilized	39.20	26.30	17.80

3.21 Gradient chips

With the help of a branching channel network the gradient chips enable the generation of concentration gradients and their use for various kinds of experiments on chip.

Product Code	Description	Lid Thickness [µm]	Material	Surface Treatment	Price [€/chip]		
					1+	10+	100+
14-1473-0834-02	Gradient generator	140	Topas	-	36.20	24.30	16.10
14-1474-0834-07	Gradient generator	125	PS	-	36.20	24.30	16.10
14-1475-0834-02	Gradient generator	140	Topas	hydrophilized	39.20	26.30	17.80
14-1476-0834-07	Gradient generator	125	PS	hydrophilized	39.20	26.30	17.80

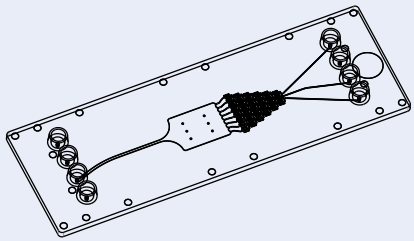


Fig. 274: Schematic drawing of gradient generator Fluidic 834

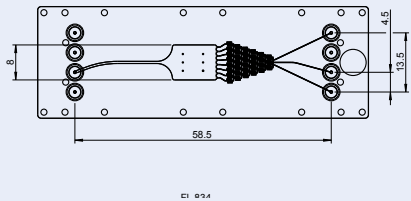
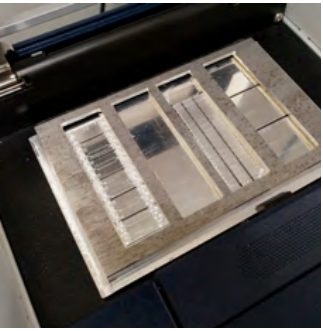
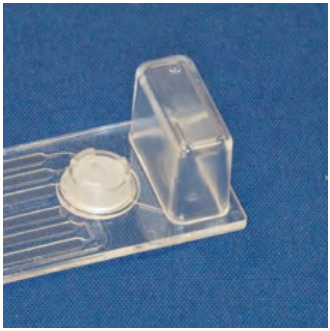
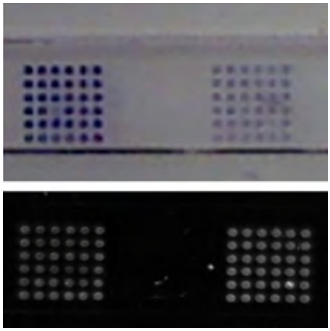


Fig. 275: Schematic drawing of gradient generator Fluidic 834







4 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.

4.1 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**.

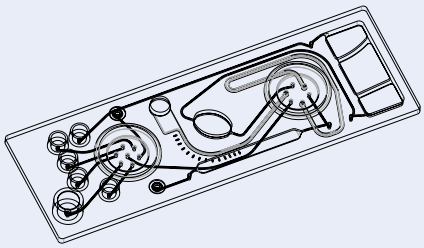


Fig. 276: Schematic drawing of assay chip 1 – Fluidic 429

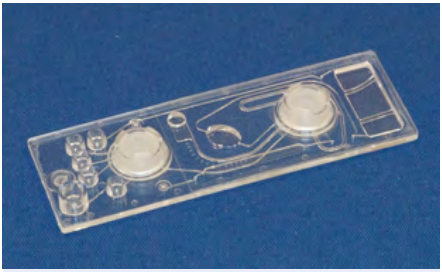


Fig. 277: Assay chip 1 – Fluidic 429 with on-chip metering, mixing, reaction and detection chamber and two integrated turning valves

Product Code	Description	Material	Lid Thickness [µm]	Price [€/chip] 1+	10+	100+
21-6000-0429-02	Assay chip 1	Topas	140	84.85	43.90	27.56

Product Code	Kit Type	Product Description	Product Code	Price [€/kit]
11-0821-0000-00	Integrated chip support kit 1	- Male Mini Luer fluid connectors, green, material: PP (10)	09-0541-0331-09	197.14
		- Male Mini Luer fluid connectors, opaque, material: TPE (10)	09-0562-0331-11	
		- Male Mini Luer plugs, red, material: PP (10)	09-0551-0334-09	
		- Male Mini Luer plugs, opaque, material: TPE (10)	09-0559-0334-11	
		- Male Luer fluid connectors, green, material: PP (10)	09-0509-0263-09	
		- Male Luer plugs, opaque, material: PP (10)	09-0503-0270-09	
		- Mini Luer to pipette adapter, material: PP (10)	09-0565-0391-09	
		- Silicone tube (ID: 0.5 mm, OD: 2.5 mm, 1 m) (2)	29-0611-0000-08	
		- PTFE tube (ID: 0.5 mm, OD: 1 mm, 1 m) (5)	29-0803-0000-16	
		- Manual turning valve actuator (1)	19-1852-0000-00	
		- Handling frame with high skirt, yellow (1)	15-4000-0000-12	

4.2 Assay chip 2 – turning valve assisted fluid control with separate assay and reference cavities

4.2.1 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** (see kit description on page 100).

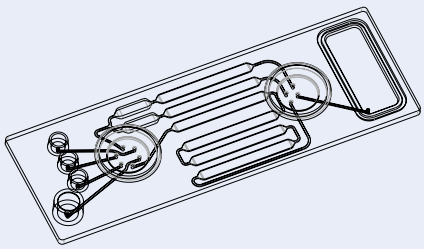


Fig. 278: Schematic drawing of assay chip 2 – Fluidic 292

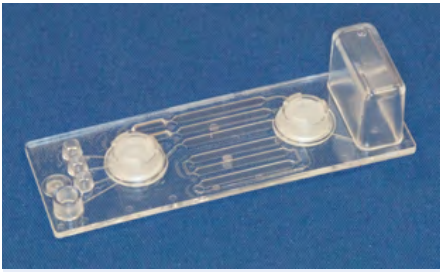


Fig. 279: Assay chip 2 – Fluidic 292 with hybridization chamber and integrated turning valve for fluid actuation

Product Code	Description	Material	Lid Thickness [µm]	Price [€/chip]		
				1+	10+	100+
21-6001-0292-02	Assay chip 2	Topas	140	88.50	49.45	28.98
21-6002-0292-02.1	Assay chip 2	Topas, black	140	88.50	49.45	28.98

4.2.2 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 [€]
22-7000-0000-00	Process set-up custom array integration	1,980.00

Product Code	Description	Material	Lid Thickness [µm]	Price [€/chip]		
				1+	10+	100+
21-6003-0292-02	Assay chip 2 with custom array	Topas	140	197.50	98.45	59.98
21-6004-0292-02.1	Assay chip 2 with custom array	Topas, black	140	197.50	98.45	59.98

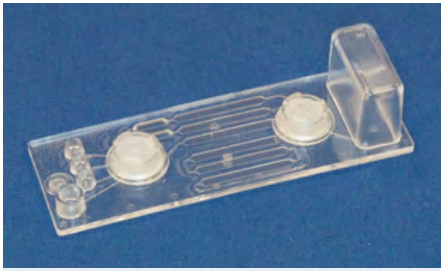


Fig. 280: Assay chip 2 – Fluidic 292 with embedded DNA array

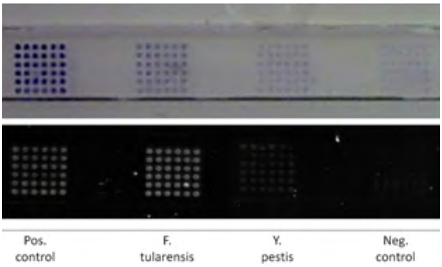


Fig. 281: Array integrated on chip

4.3 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**.

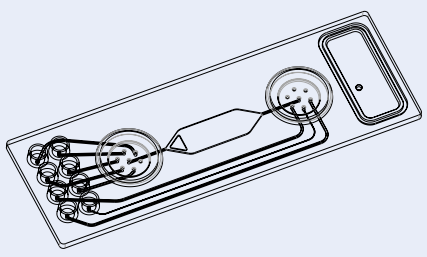


Fig. 282: Schematic drawing of assay chip 3 – Fluidic 490

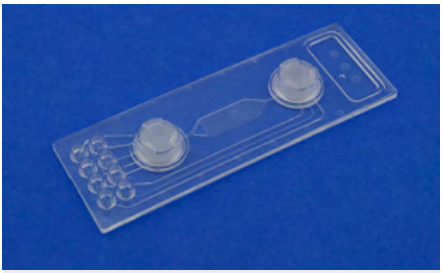


Fig. 283: Assay chip 3 – Fluidic 490 with central reaction chamber and integrated turning valve for fluid actuation

Product Code	Description	Material	Lid Thickness [µm]	Price [€/chip]		
				1+	10+	100+
21-6005-0490-02	Assay chip 3	Topas	140	75.40	42.45	26.37

Product Code	Kit Type	Product Description	Product Code	Price [€/kit]
11-0823-0000-00	Integrated chip support kit 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)	09-0541-0331-09 09-0562-0331-11 09-0551-0334-09 09-0559-0334-11 09-0565-0391-09 29-0611-0000-08 29-0803-0000-16 19-1852-0000-00 15-4000-0000-12	159.64

4.4 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.

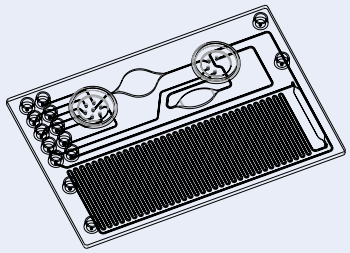


Fig. 284: Schematic drawing of integrated continuous flow PCR chip with sample preparation – Fluidic 501

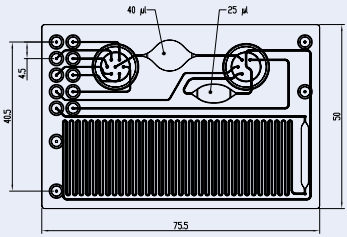


Fig. 285: Integrated continuous flow PCR chip with sample preparation – with dimensional measures

Product Code	Lid Thickness [µm]	Material	Comments Design, Channel Dimensions	Price [€/chip]		
				1+	10+	100+
08-0475-0501-03	200	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
08-0475-0501-02/05	100	Topas/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]
11-0830-0000-00	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)	09-0541-0331-09 09-0562-0331-11 09-0551-0334-09 09-0559-0334-11 09-0565-0391-09 29-0611-0000-08 29-0803-0000-16 19-1852-0000-00	144.64

4.5 Immunofiltration System for Analytical Applications: IFSA 1 Immunoassay Chip – Frit-based enrichment and detection system for immunoassays

The IFSA chip family combines lab-on-a-chip technology with the advantages of frit-based assays, namely the enrichment of the sample through filtration and specific binding on the frit surface. Detection takes place directly on the frit 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 frits 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. Alternatively the ChipGenie® edition I instrument combining the pipettor with the read-out function can be used.

Chip-based frit technology is a collaborative work within the project IFSA together with the FZMB and Senova GmbH.

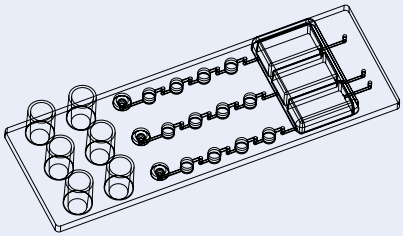


Fig. 286: Schematic drawing of IFSA 1 Immunoassay Chip – 249

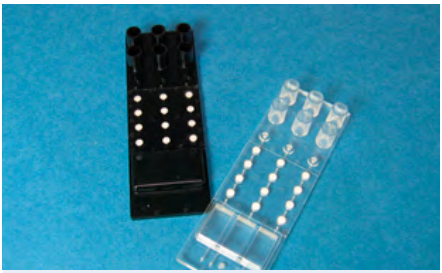


Fig. 287: IFSA 1 Immunoassay Chip – Equipped for three different samples with two measurement frits, one positive and one negative control frit

Fig. 288: Detail of stained frit area of IFSA 1 Immunoassay Chip

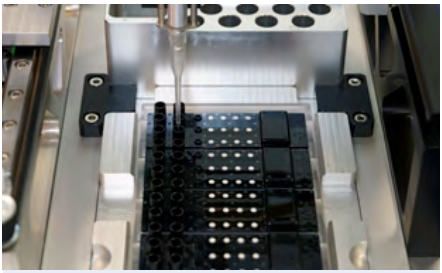


Fig. 289: IFSA 1 Immunoassay Chip in ChipGenie® edition I instrument

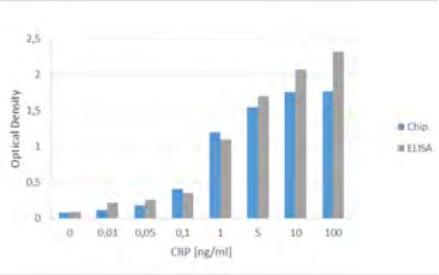


Fig. 290: Comparison of IFSA 1 Immunoassay Chip with standard ELISA for CRP detection (polyHRP / TMB) based on colorimetric read-out.

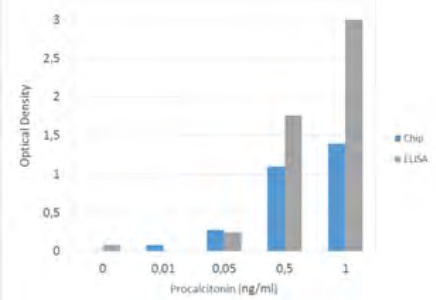


Fig. 291: Comparison of IFSA 1 Immunoassay Chip with standard ELISA for Procalcitonin detection (polyHRP / TMB) based on colorimetric read-out.

Product Code	Description	Price [€]
22-7001-0000-00	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	Short product description	Product Description	Price [€]
08-0496-0000-00	ChipGenie® edition I instrument	Pipetting system with optical read-out e.g. for IFSA 1 Immunoassay Chips	14,240.00

Product Code	Embedded Frits	Functional Description	Chip Material	Price [€/chip]* 10+	100+
21-6006-0249-02	- Negative control - Positive control (anti POD) - Anti hapten 1 - Anti hapten 2	IFSA 1 Immunoassay Chip pre-equipped with two generic frits 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 [€]
20-5106-0000-00	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
20-5107-0000-00	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

4.6 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.

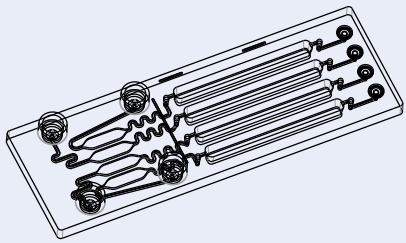
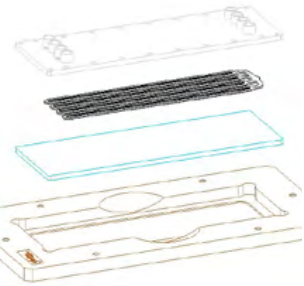
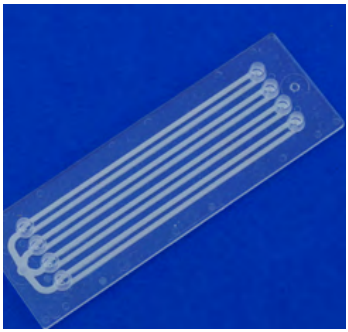


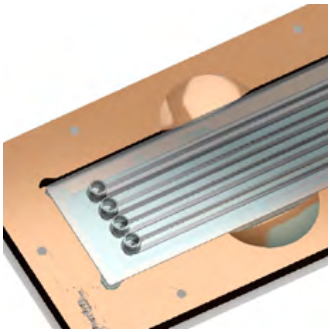
Fig. 292: Schematic drawing of assay chip 4, Fluidic 638

Fig. 293: Assay chip 4 (Fluidic 638) with attached tanks

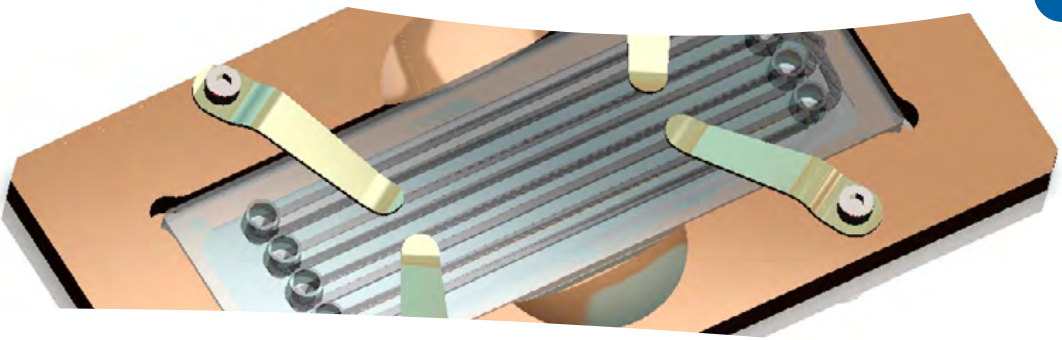
Product Code	Chamber Volume [µl]	Chamber Depth [µm]	Lid Thickness [µm]	Material	Surface Treatment	Price [€/chip] 1+	10+	100+
21-6008-0638-02	10	500	140	Topas	-	36.20	24.30	16.10
21-6009-0638-07	10	500	125	PS	-	36.20	24.30	16.10
21-6010-0638-02	10	500	140	Topas	hydrophilized	39.20	26.30	17.80
21-6011-0638-07	10	500	125	PS	hydrophilized	39.20	26.30	17.80







5 Self-sealing and releasable chips & accessories



Self-sealing and releasable chips & accessories

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 when an array on a glass surface needs to be further processed or if specimens have to be removed from the microfluidic device.

microfluidic ChipShop's self-sealing and releasable chips 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 with 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.

5 Self-sealing and releasable chips & accessories

5.1 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.

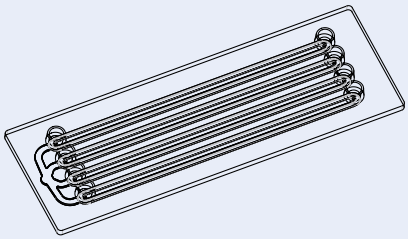


Fig. 294: Schematic drawing of Fluidic 745 – Self-sealing and releasable chip

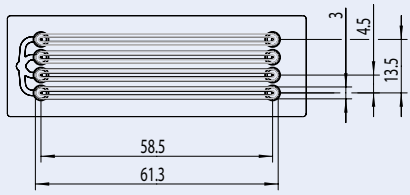


Fig. 295: Self-sealing and releasable chip Fluidic 745 – Self-sealing and releasable chip

Product Code	Channel Volume 1 [µl]	Width [µm]	Depth [µm]	Lid Thickness [µm]	Material	Surface Treatment	Price [€/chip] 10+	100+
28-6012-0745-07	11.8	1.0	0.2	125	PS	-	34.30	19.10
28-6013-0745-07	11.8	1.0	0.2	125	PS	hydrophilized	27.30	21.40

5.2 Handling frames for self-sealing and releasable chips – for slide-format chips

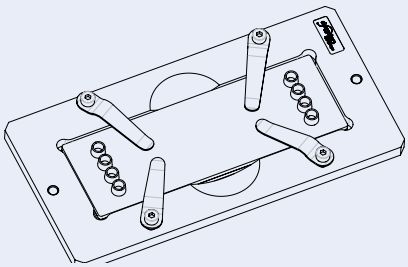


Fig. 296: Handling frame for self-sealing and releasable chips in slide-format

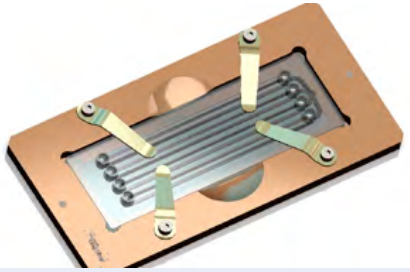
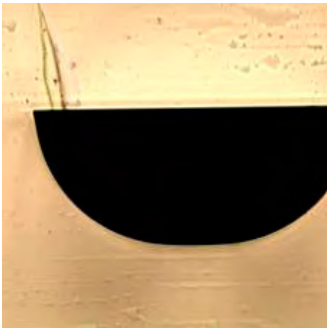
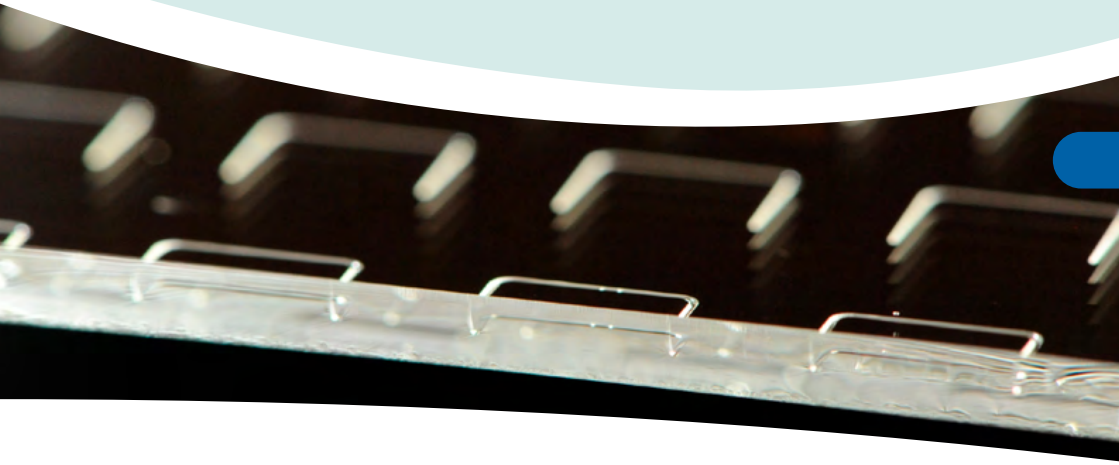


Fig. 297: Handling frame with chip – self-sealing and releasable chips

Product Code	Description	Price [€] 1+	5+
22-4505-0000-80	Handling-frame for self-sealing and releasable chips in slide-format	244.00	204.00



6 Microfluidic chips – Glass



Microfluidic chips – Glass

Glass is the material of choice if elevated temperatures or organic solvents come into place. 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 port interfaces - 96 µm through holes on the chip with spacing of 4.5 mm between each other.

6.1.1 Straight channel chips – glass

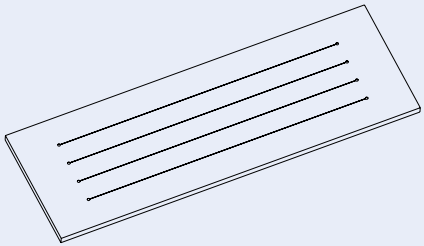


Fig. 298: Schematic drawing of straight channel chip – Fluidic 581

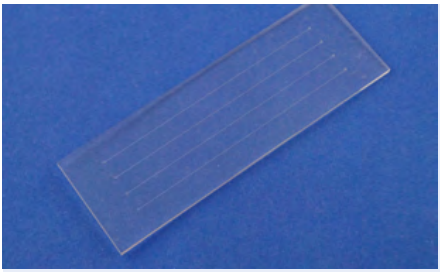


Fig. 299: Straight channel chip – Fluidic 581

Product Code	Description	Channel Width [µm]	Channel Depth [µm]	Channel Length [mm]	Lid Thickness [µm]	Material	Price [€/chip] 1+	3+	5+	10+
13-1302-0581-20	Straight channel chip	50	50	58.5	150	Glass	143.70	109.75	99.78	89.70

6.1.2 Chamber chips – glass

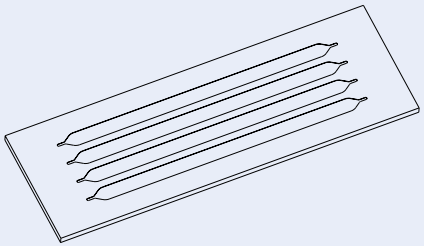


Fig. 300: Schematic drawing of chamber chip – Fluidic 582

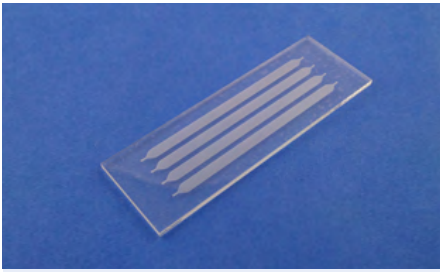


Fig. 301: Chamber chip – Fluidic 582

Product Code	Description	Channel Width [mm]	Channel Depth [µm]	Channel Length [mm]	Lid Thickness [µm]	Material	Price [€/chip] 1+	3+	5+	10+
13-1303-0582-20	Chamber chip	3	100	58.5	150	Glass	143.70	109.75	99.78	89.70

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.

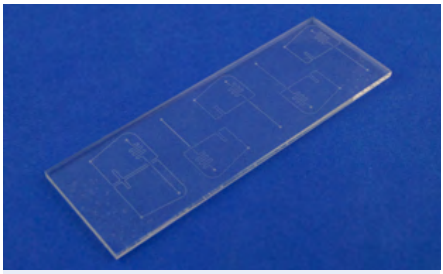


Fig. 302: Glass droplet generator chip Fluidic 441

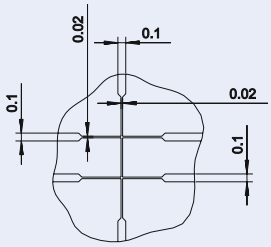


Fig. 303: Glass droplet generator chip Fluidic 441 – detail of cross element

Product Code	Description	Channel Depth [µm]	Material	Price [€/chip] 1+	3+	5+	10+
13-1300-0441-20	Droplet generator chip	20	Glass	143.70	109.75	99.78	89.70

6.1.4 Meander chips– glass

The meander chips can serve as reaction units as well as mixing device.

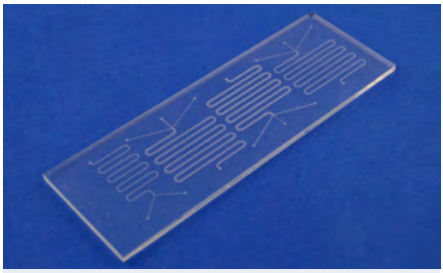


Fig. 304: Meander chip Fluidic 442

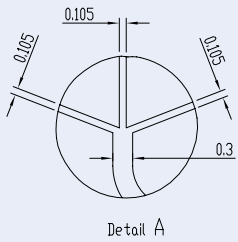


Fig. 305: Meander chip Fluidic 442 – channel details

Product Code	Description	Channel Depth [µm]	Material	Price [€/chip] 1+	3+	5+	10+
14-1301-0442-20	Meander chip	20	Glass	143.70	109.75	99.78	89.70

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 see page 180 chapter 11.1 Lab-on-a-Chip Handling Platform/Cell Culture Incubator – LOC HP/CCI 1 for more information."

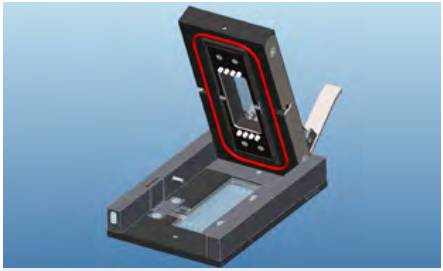


Fig. 306: Layout LOC HP/CCI 1 – Handling frame for chips in the format of a microscopy slide

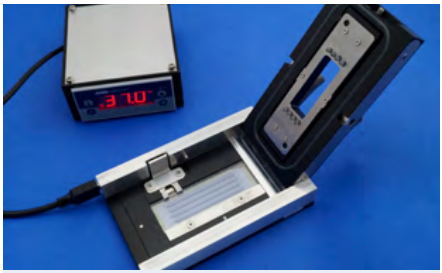
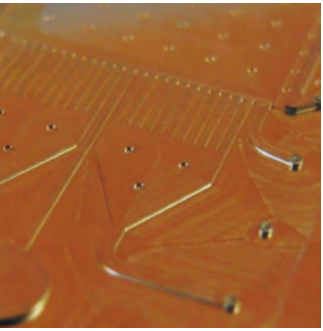


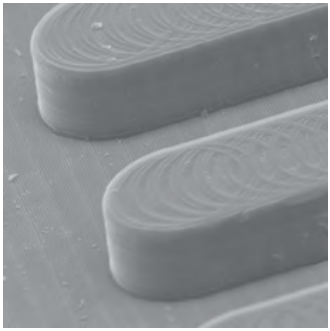
Fig. 307: LOC HP/CCI 1 – Handling frame for chips in the format of a microscopy slide

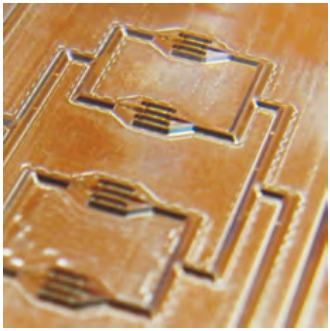
Product Code	Description	Adapter plate 2x4	2x8	2x16	Price [€]
22-4504-0000-00	LOC HP/CC1 – without heating elements – handling frame for glass chips (incl. one adapter plate of your choice)		1,370.00		1,370.00
22-4502-0000-00	LOC HP/CC1 – with heating elements – handling frame for glass chips (incl. one adapter plate of your choice)		1,875.00		1,875.00
22-4503-0000-00	Additional adapter plate	390.00	390.00	390.00	390.00

6.2.2 Stand alone interfaces: olive and female Mini Luer

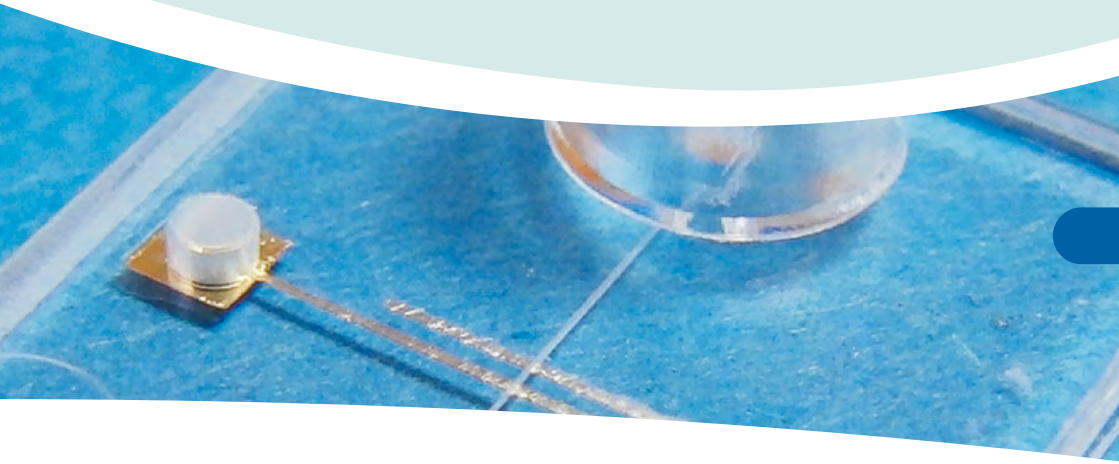
microfluidic ChipShop developed stand alone interfaces to facilitate the application of tubing on through-holes interfaces. They come in olive and female Mini Luer interfaces. These stand alone interfaces can be easily glued on the chip. Please see page 132 chapter 8.1.10 Stand alone olive and page 133 chapter 8.1.11 Stand alone female Mini Luer 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

Within the silicone chip services portfolio a standard kit for easy fabrication of first silicone microfluidic chips is offered together with our partner GeSim within the brand name MicCell. Exceeding this service, *microfluidic ChipShop* offers for casting of PDMS custom-design silicon stampers.

7.1.1 Silicone casting kit – MicCell

The MicCell system from our partner GeSim is a modular and versatile system to create individual PDMS microchannel setups and run own rapid prototyping experiments under the microscope. Its fluidic system is made of PDMS elastomer (silicone) – precast microchannel layers can be bought (called PDMS Channel Plates) or they can be self-made at user side with a special casting station. The system is easy to use, and it the entire periphery can be reused with new microfluidic channel designs. Items needed for the new microfluidic design are a new master and PDMS solution.

The modularity of the system allows to start with a small setup (also using existing syringe pumps) and grow bigger as required. Standard MicCells can be purchased in the sizes 22 mm x 22 mm and 25 mm x 75 mm; special designs (e. g. with microelectrodes) are available on request.

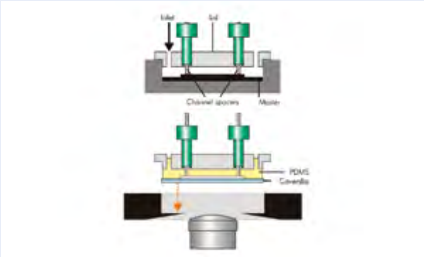


Fig. 308: Molding of the Channel Plate on a silicon master and subsequent mounting in an inverted microscope

7.1.1.1 PDMS Channel Plate flow cells (precast, ready to use)

The Channel Plate (CP) is a precast silicone gel layer that comes with a polycarbonate body (lid) containing all necessary threaded holes so that it is ready to use. The channel is closed by a coverslip (that can be plain or equipped with a microarray, nanostructures, cultured cells, etc.). The use of the system is simple: Add tubes, insert the Channel Plate into the MicCell support, and place it in an inverted microscope. Plasma activation of the PDMS to seal the channel is usually not necessary. 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 other experiments. Other designs are available on request.

The polycarbonate (PC) body above the PDMS Channel Plate that contains all fluidic connections can be recycled.

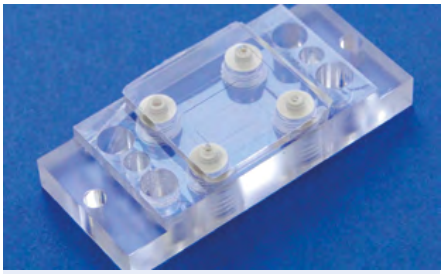


Fig. 309: Channel Plate 22 mm x 22 mm with S-shaped single channel, precast, ready to use

Fig. 310: Channel Plate 22 mm x 22 mm with double-Y-branched channel, precast, ready to use

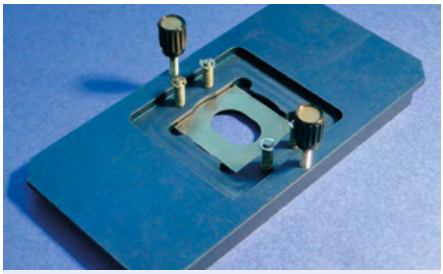


Fig. 311: MicCell support for 22x22 Channel Plates, to be placed in an inverted microscope via an adapter plate (not shown)

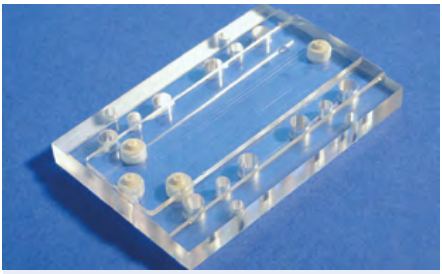


Fig. 312: Channel Plate 25x75 with crossed-shaped (T-junction) channel, different channel designs are available on request

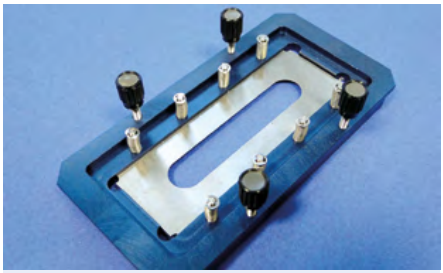


Fig. 313: MicCell support for 25x75 Channel Plate

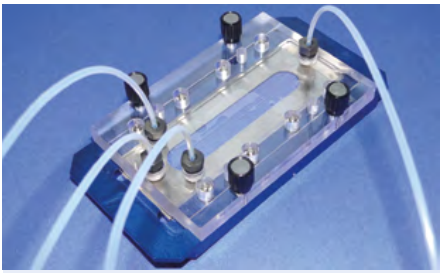


Fig. 314: Fully assembled MicCell with 25x75 Channel Plate, cross-shaped with 3 inlets and 1 outlet

Product Code	Description	Channel Design, Depth [µm]	Price [€/chip]		
			1+	5+	10+
07-0452-0000-06	PDMS-CP/22x22/S-100	S-shape, 100 µm deep	157.00	141.00	131.00
07-0453-0000-06	PDMS-CP/22x22/2Y-50	Double-Y-shape, 50 µm deep	157.00	141.00	131.00
07-0455-0000-06	PDMS-CP/25x75/Cross-50	Cross shape, 50 µm deep	273.00	246.00	225.00
07-0454-0000-00	MicCell support 22x22	to fix a PDMS-CP	819.00	733.00	682.00
07-0456-0000-00	MicCell support 25x75	to fix a PDMS-CP	819.00	733.00	682.00

7.1.1.2 Accessories for the PDMS Channel Plate

With these products individual flow cells can be cast. The casting station comes with an overview on the technology, detailed hands-on instructions, PC-bodies, channel spacers and one liter of Sylgard 184 two-component PDMS solution (base and curing agent); a microstructured master for molding must be ordered separately. You also need single-use glassware and syringes with needles 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 box.

Fig. 315: Polycarbonate (PC) body 22 mm x 22 mm

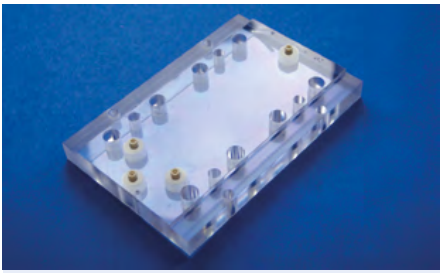


Fig. 316: Polycarbonate (PC) body 25 mm x 75 mm

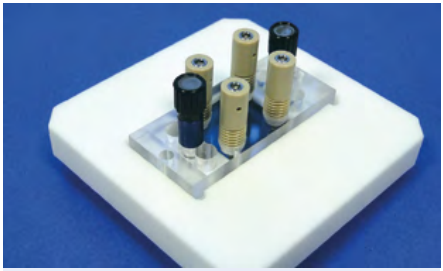


Fig. 317: Casting Station 22 mm x 22 mm. Top: assembled, including channel spacers (brown)

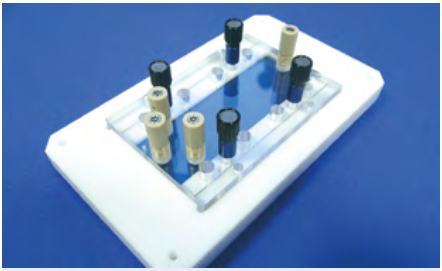


Fig. 318: Casting Station 25 mm x 75 mm

Fig. 319: Casting Station box

Product Code	Description	Design	Price [€] 1+	10+	20+
07-0457-0000-03	polycarbonate-body, 22 x 22 mm / 4	22 mm x 22 mm, 4 inlets 1/4-28 UNF	89.00	79.00	73.00
07-0458-0000-03	polycarbonate-body, 25 x 75 mm / 6	25 mm x 75 mm, 6 inlets 1/4-28 UNF	204.00	170.00	152.00
07-0459-0000-00	Casting station box 22 x 22 mm	casting station for 22 x 22 mm PDMS-CP, accessories*, technology description	2,173.00	1,942.00	1,873.00
07-0460-0000-00	Casting station box 25 x 75 mm	casting station for 25 x 75 mm PDMS-CP, accessories*, technology description	2,879.00	2,572.00	2,451.00
07-0461-0000-00	Custom specific silicon master structure	Channel design with depth 10-50 µm, width > height	2,490.00		

* Set of PDMS-CPs, channel spacers, mixing glasses, syringes, needles

7.2 Silicon master structures

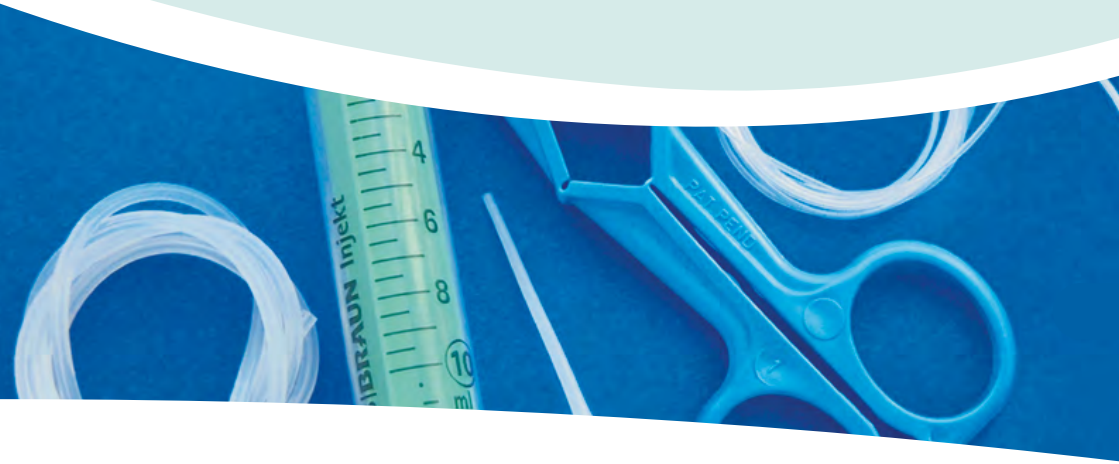
For casting of silicone *microfluidic ChipShop* offers 4 inch (100 mm diameter) silicon wafer. The wafer can be ordered with 1 – 3 channel depth differing in pricing.
Following design rules need to be considered:

- Wafer size: 4 inch
- Wafer thickness: 700 µm
- Minimum feature size: 10 µm, less upon request at extra cost
- Maximum structure depth: 50 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+
30-8001-0000-21	One structure depth	2,490.00	2,290.00	1,980.00
30-8002-0000-21	Two structure depths	5,980.00	5,250.00	4,700.00
30-8003-0000-21	Three structure depths	10,450.00	9,550.00	8,750.00

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.

8.1 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 to heavy forces applied by the user himself on the PP interfaces can damage the chip, the TPE interfaces will withstand such handling.

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 the 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.

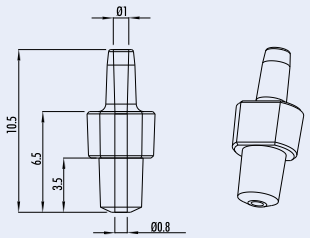


Fig. 320: Schematic drawing of a Mini Luer connector

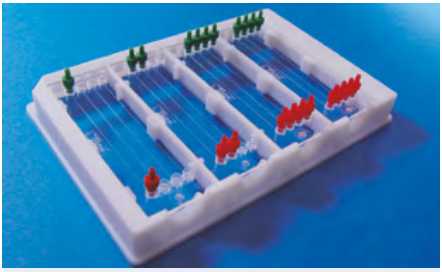


Fig. 321: Single, twin type Mini Luer connectors and row of four

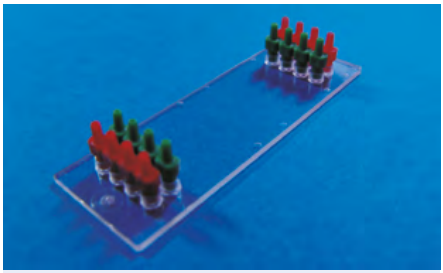


Fig. 322: Four times row of four Mini Luer connectors mounted on a Mini Luer platform

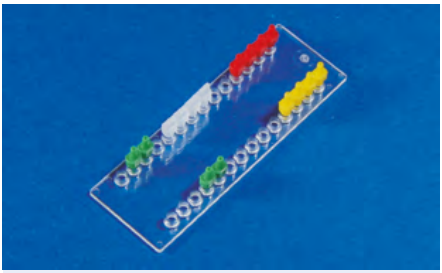


Fig. 323: Mini Luer connectors mounted on a Mini Luer fluidic platform

Product Code	Connector Type	Material	Color	Price [€/10 pieces] 1+	5+	10+	20+
09-0538-0331-09	Single	PP	Opaque	19.00	14.00	9.40	7.40
09-0539-0331-09	Single	PP	Yellow	19.00	14.00	9.40	7.40
09-0540-0331-09	Single	PP	Red	19.00	14.00	9.40	7.40
09-0541-0331-09	Single	PP	Green	19.00	14.00	9.40	7.40
09-0542-0331-09	Single	PP	Blue	19.00	14.00	9.40	7.40
09-0543-0331-09	Single	PP	Black	19.00	14.00	9.40	7.40
09-0532-0332-09	Twin	PP	Opaque	19.00	14.00	9.40	7.40
09-0533-0332-09	Twin	PP	Yellow	19.00	14.00	9.40	7.40
09-0534-0332-09	Twin	PP	Red	19.00	14.00	9.40	7.40
09-0535-0332-09	Twin	PP	Green	19.00	14.00	9.40	7.40
09-0536-0332-09	Twin	PP	Blue	19.00	14.00	9.40	7.40
09-0537-0332-09	Twin	PP	Black	19.00	14.00	9.40	7.40
09-0544-0333-09	Row of four	PP	Opaque	19.00	14.00	9.40	7.40
09-0545-0333-09	Row of four	PP	Yellow	19.00	14.00	9.40	7.40
09-0546-0333-09	Row of four	PP	Red	19.00	14.00	9.40	7.40
09-0547-0333-09	Row of four	PP	Green	19.00	14.00	9.40	7.40
09-0548-0333-09	Row of four	PP	Blue	19.00	14.00	9.40	7.40
09-0549-0333-09	Row of four	PP	Black	19.00	14.00	9.40	7.40
09-0562-0331-11	Single	TPE	Opaque	19.00	14.00	9.40	7.40
09-0563-0332-11	Twin	TPE	Opaque	19.00	14.00	9.40	7.40
09-0564-0333-11	Row of four	TPE	Opaque	19.00	14.00	9.40	7.40

8.1.2 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).

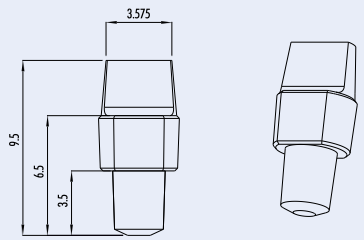


Fig. 324: Schematic drawing of a Mini Luer plug

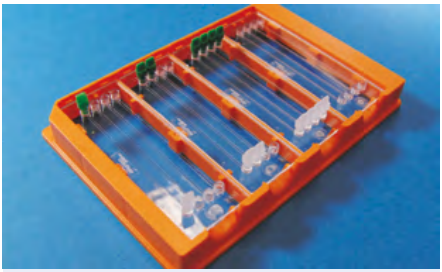


Fig. 325: Single, twin type Mini Luer plugs and row of four

Product Code	Plug Type	Material	Color	Price [€/10 pieces] 1+	5+	10+	20+
09-0550-0334-09	Single	PP	Opaque	19.00	14.00	9.40	7.40
09-0551-0334-09	Single	PP	Red	19.00	14.00	9.40	7.40
09-0552-0334-09	Single	PP	Green	19.00	14.00	9.40	7.40
09-0553-0335-09	Twin	PP	Opaque	19.00	14.00	9.40	7.40
09-0554-0335-09	Twin	PP	Red	19.00	14.00	9.40	7.40
09-0555-0335-09	Twin	PP	Green	19.00	14.00	9.40	7.40
09-0556-0336-09	Row of four	PP	Opaque	19.00	14.00	9.40	7.40
09-0557-0336-09	Row of four	PP	Red	19.00	14.00	9.40	7.40
09-0558-0336-09	Row of four	PP	Green	19.00	14.00	9.40	7.40
09-0559-0334-11	Single	TPE	Opaque	19.00	14.00	9.40	7.40
09-0560-0335-11	Twin	TPE	Opaque	19.00	14.00	9.40	7.40
09-0561-0336-11	Row of four	TPE	Opaque	19.00	14.00	9.40	7.40

8.1.3 Male Mini Luer plugs – Low volume displacement plugs

These special male Mini Luer plugs are designed to fit in the through hole integrated on the microfluidic chip and surrounded by the female Mini Luer interface. They seal in this connecting hole only and simply replace the volume in this hole and not the complete volume of the female Mini Luer. This avoids liquid movement due to air displacement of the Mini Luer volume.

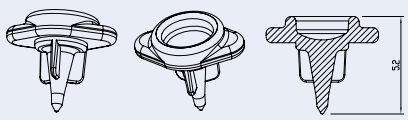


Fig. 326: Mini Luer plug – low volume displacement plug

Fig. 327: Mini Luer plug – low volume displacement plug

Product Code	Description	Plug Type	Material	Color	Price [€/10 pieces] 1+	5+	10+	20+
09-0567-0438-09	Male Mini Luer plugs – Low volume displacement (Fluidic 438)	Single	PP	Red	19.00	14.00	9.40	7.40
09-0578-0438-11	Male Mini Luer plugs – Low volume displacement (Fluidic 438)	Single	TPE	Opaque	19.00	14.00	9.40	7.40

8.1.4 One-wing male Mini Luer plugs – Low volume displacement plugs

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.

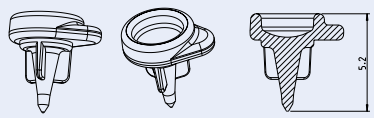


Fig. 328: Schematic drawing of one-wing Mini Luer plug – low volume displacement plug – Fluidic 793

Fig. 329: One-wing Mini Luer plug – low volume displacement plug – Fluidic 793

Product Code	Description	Plug Type	Material	Color	Price [€/10 pieces] 1+	5+	10+	20+
09-0576-0793-09	One-wing Mini Luer low volume displacement plug (Fluidic 793)	Single	PP	Red	19.00	14.00	9.40	7.40
09-0577-0793-11	One-wing Mini Luer low volume displacement plug (Fluidic 793)	Single	TPE	Opaque	19.00	14.00	9.40	7.40

8.1.5 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 connector. This allows the realization of higher applied fluidic pressures as well as a reduced contamination risk.

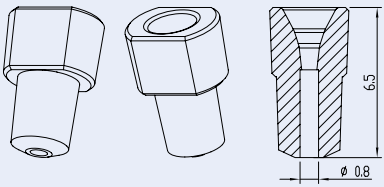


Fig. 330: Mini Luer to pipette adapter

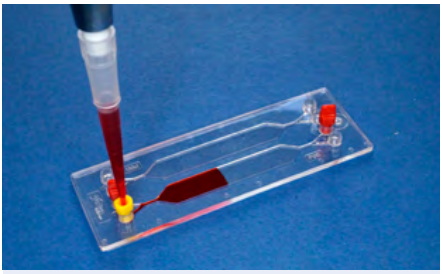


Fig. 331: Example of a Mini Luer to pipette adapter in use with a Rhombic Chamber chip

Product Code	Description	Material	Price [€/10 pieces] 1+	10+
09-0565-0391-09	Mini Luer to pipette adapter	PP	19.00	9.40

8.1.6 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 connectors. Due to the size of the Luer connector, only every second Mini Luer port can be utilized with this adapter.

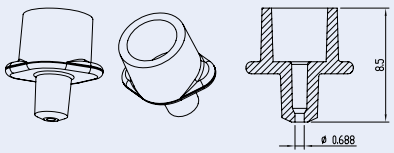


Fig. 332: Mini Luer to Luer adaptor

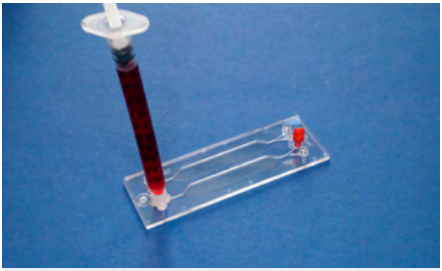


Fig. 333: Example of a Mini Luer to Luer adaptor in use with a Rhombic Chamber chip

Product Code	Description	Material	Price [€/10 pieces] 1+	10+
09-0566-0390-09	Mini Luer to Luer adapter	PP	19.00	9.40

8.1.7 Female Luer Lok compatible connectors

Our female Luer Lok compatible connectors are tools for chip prototyping. These devices can be mounted on the fluidic chips and are compatible with standard male Luer and Luer Lok adapters as for example used for syringes. This enables also prototyped chips, usually chips with directly milled structures, or glass and silicon microfluidic devices to make use of standard fluidic interfaces. The diameter of the through hole is 1.3 mm.

The connectors are available with straight walls (product code 09-0500-0302-01) or a wide base for easier glueing (product code 09-0512-0303-01.

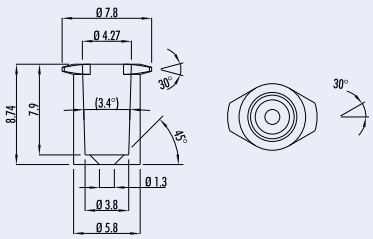


Fig 334: Schematic drawing of the Luer Lok compatible adapter

Fig. 335: Female Luer Lok connector with straight walls

Product Code	Material	Price [€/10 pieces] 1+	5+	10+	20+
09-0500-0302-01	PMMA	30.00	25.00	20.00	15.00
09-0501-0302-02	Topas	30.00	25.00	20.00	15.00
09-0502-0302-03	PC	30.00	25.00	20.00	15.00

The female Luer Lok compatible connectors 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+
10-0570-0697-00	Adhesive ring Fluidic 697 - for female Luer Lok compatible interface (Fluidic 302)	18.40	7.89

8.1.8 Female Luer connector – 90° angle for horizontal operation

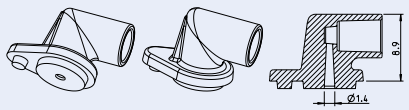


Fig. 336: Female Luer for horizontal syringe integration – schematic drawing of Fluidic 544

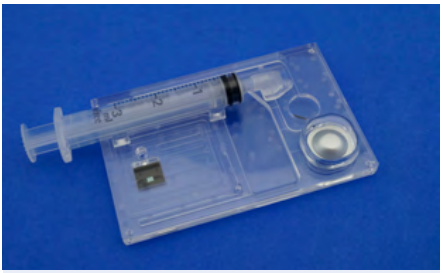


Fig. 337: MrCyte-Cartridge – diagnostic cartridge with horizontal syringe operation

Product Code	Description	Material	Price [€/10 pieces] 1+	5+	10+	20+
09-0579-0544-01	Female Luer connector - 90° angle for horizontal operation (Fluidic 544)	PMMA	30.00	25.00	20.00	15.00
09-0580-0544-02	Female Luer connector - 90° angle for horizontal operation (Fluidic 544)	Topas	30.00	25.00	20.00	15.00
09-0581-0544-03	Female Luer connector - 90° angle for horizontal operation (Fluidic 544)	PC	30.00	25.00	20.00	15.00

8.1.9 Female Luer Lok compatible connectors with wide base

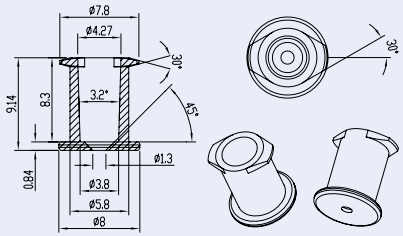


Fig. 338: Schematic drawing of female Luer Lok compatible connectors with wide base

Fig. 339: Female Luer Lok connector with wide base

Product Code	Material	Price [€/10 pieces]			
		1+	5+	10+	20+
09-0512-0303-01	PMMA	30.00	25.00	20.00	15.00
09-0513-0303-02	Topas	30.00	25.00	20.00	15.00
09-0514-0303-03	PC	30.00	25.00	20.00	15.00

The female Luer Lok 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+
10-0571-0698-00	Adhesive ring Fluidic 698 - for female Luer Lok compatible interface wide base (Fluidic 303)	18.40	7.89

8.1.10 Stand alone olive

Through-holes are the common interface for most glass chips and a few polymer chips. Given its plain structure, the interface might pose some issues when connecting tubes. *microfluidic ChipShop* developed stand alone olives to solve this. Stand alone olives serve as an adapter to the through-hole interface and can be easily glued on it.

Product Code	Description	Material	Price [€/10 pieces] 1+	5+	10+	20+
09-0568-0630-09	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. Such adhesive rings can be ordered in connection with the fluidic interfaces.

Product Code	Description	Price [€/unit] – 1 unit = 10 adhesive rings 1+	10+
10-0572-0699-00	Adhesive ring Fluidic 699 - for stand alone chip connector - female Mini Luer interface (Fluidic design 631) and olive interface (Fluidic design 630)	18.40	7.89

8.1.11 Stand alone female Mini Luer

The solution for the through-hole interface is also available as female Mini Luer interface. This offers another ready-to-use adapter beside the stand alone olive.

Product Code	Description	Material	Price [€/10 pieces] 1+	5+	10+	20+
09-0569-0631-09	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. Such adhesive rings can be ordered in connection with the fluidic interfaces.

Product Code	Description	Price [€/unit] – 1 unit = 10 adhesive rings 1+	10+
10-0572-0699-00	Adhesive ring Fluidic 699 - for stand alone chip connector - female Mini Luer interface (Fluidic design 631) and olive interface (Fluidic design 630)	18.40	7.89

8.1.12 Male Luer plugs

The male Luer plugs enable to close the female Luer and Luer Lok interfaces on our fluidic platforms. With the help of these plugs, 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 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.

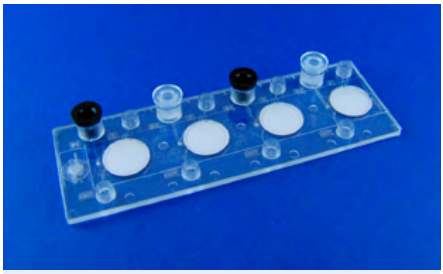


Fig. 340: Male Luer plug

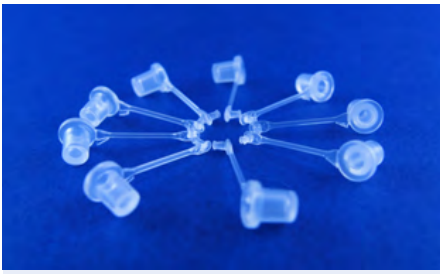


Fig. 341: Male Luer plug with retaining strip

Alternatively, a version of the Luer plug is available which has a reduced plug length and thus displaces less volume in the Luer interface when applied. While the standard Luer plug displaces a volume of approx. 55 µl, the reduced height Luer plug only displaces 20 µl.

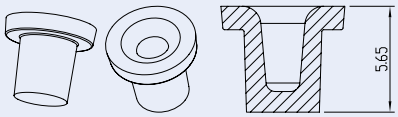


Fig. 342: Schematic drawing Luer plug 270

Fig. 343: Luer plugs 270

Fig. 344: Schematic drawing Luer plug with reduced displacement volume 262

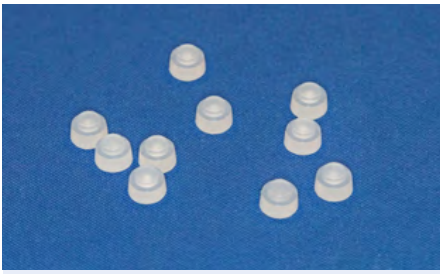


Fig. 345: Luer plug with reduced displacement volume 262

Product Code	Description	Material	Price [€/10 pieces] 1+	10+
09-0503-0270-09	Male Luer plug, opaque	PP	19.00	9.40
09-0504-0270-09	Male Luer plug, black	PP	19.00	9.40
09-0505-0264-09	Male Luer plug with retaining strip, opaque	PP	25.00	14.40
09-0506-0264-09	Male Luer plug with retaining strip, black	PP	25.00	14.40
09-0507-0262-09	Male Luer plug with reduced displaced volume, opaque	PP	25.00	14.40

8.1.13 Male Luer fluid connectors

The male Luer fluid connectors are the tool to couple the female Luer interfaces on the fluidic platforms with tubing deriving from pumps, valves or reservoirs.

An important feature of these connectors is the massively reduced death 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.

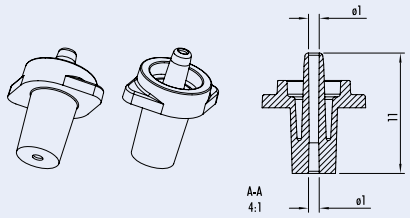


Fig. 346: Male Luer fluid connector

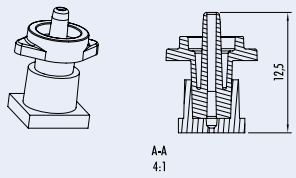


Fig. 347: Male Luer fluid connector coupled with the female counterpart on chip

Fig. 348: Male Luer fluid connector with olive interface

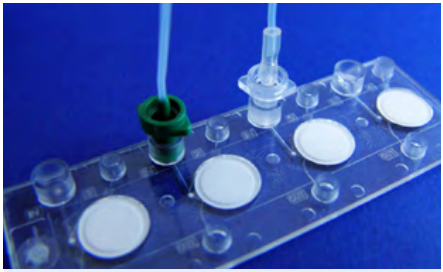


Fig. 349: Male Luer fluid connector with olive interface mounted on chip

Product Code	Description	Price [€/10 pieces] 1+	10+
09-0508-0263-09	Male Luer fluid connector, opaque	25.00	14.40
09-0509-0263-09	Male Luer fluid connector, green	25.00	14.40

8.1.14 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. 350: NanoPorts Assembly family

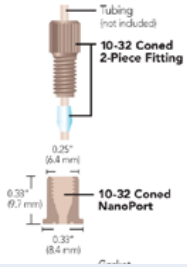


Fig. 351: N-333 NanoPort

Product Code	Comment	Price [€/piece] 1+	10+
09-0524-0000-00	N-333 NanoPort	37.00	32.10

8.1.15 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 2.1.1.1 (product codes 01-0152-0143-01 to 01-0161-0138-02) or cross-shaped channel chips in chapter 2.4.1.1 (product codes 02-0758-0082-01 to 02-0765-0166-02). 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 Lok 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 Lok adaptors** 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. 352: Cross-shaped channel chip with three bonded port connectors and three chip reservoirs

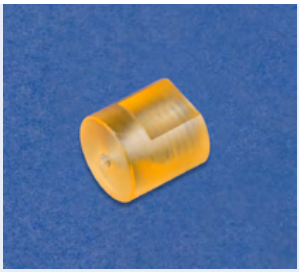


Fig. 353: Bonded port connector

Fig. 354: Female Luer Lok adapter

Fig. 355: One piece plug (left) and one piece fitting (right)

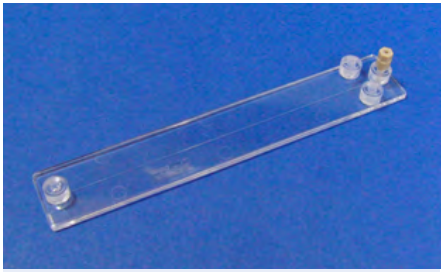


Fig. 356: Cross-shaped channel chips with embedded threads to connect with LabSmith's one piece fittings

Product Code	Description	Material	Price [€] 1+	10+
09-0595-0000-13	Bonded Port Connector	Ultem	8.50	7.95
09-0596-0000-12	Chip Reservoir	PEEK	9.90	9.00
09-0597-0000-12	Luer Lok Adapter	PEEK	29.00	26.00
09-0598-0000-12	One piece fitting	PEEK	9.90	9.00
09-0599-0000-12	One piece plug	PEEK	7.50	6.90
09-0600-0000-00	Complete LabSmith connection kit. Contains 15 bonded port connectors, 15 one piece fittings, 5 one piece plugs, 5 chip reservoirs, 2 Luer-Lock adaptors, 1 m 360 μm OD PEEK capillary, 12 ml epoxy adhesive, 1/8" hex wrench		470.00	425.00
03-0780-0106-01	Cross-shaped channel chip with threads in the fluidic interface to connect with LabSmith one piece fitting (09-0598-0000-12)	PMMA	62.40	43.60

8.2 Liquid storage

One problem that often occurs with microfluidics is the storage of liquid reagents on the chip. This often conflicts with either dry-stored reagents on the chip, the available space, or the volume of the liquid. For this reason, *microfluidic ChipShop* has developed several solutions to deal with this task, including our so-called "tank" solution as well as blister pouches.

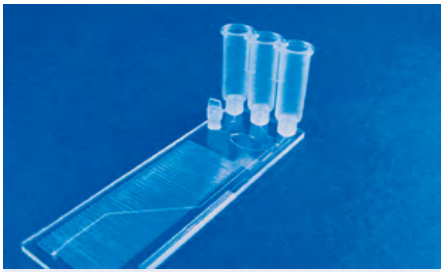


Fig. 357: Tanks mounted on a microfluidic chip

Fig. 358: Blister pouches integrated in a microfluidic chip

8.2.1 Tank

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 the tanks either by a mechanical piston or pneumatic pressure.

8.2.1.1 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. Examples for the application of these tanks can be seen in Figs. 652, 658 and 659

Fig. 359: Single, double, and triple tank

Fig. 360: Filled tanks sealed with alumina foil

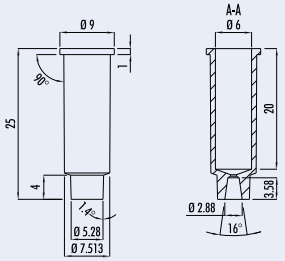


Fig. 361: Single tank

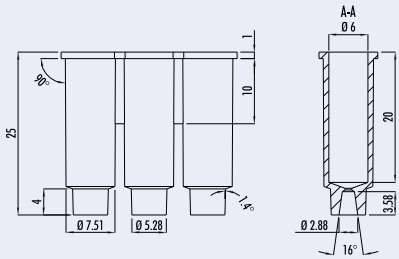


Fig. 362: Triple tank

Product Code	Description	Material	Price [€/10 pieces] 1+	10+	100+
16-0601-0229-09	Single tank piercing interface	PP	25.00	10.20	5.40
16-0602-0230-09	Double tank piercing interface	PP	26.00	11.80	5.80
16-0603-0231-09	Triple tank piercing interface	PP	27.00	12.40	6.10

8.2.1.2 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.

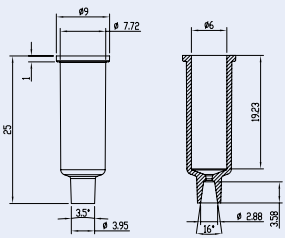


Fig. 363: 500 μl single tank with Luer interface

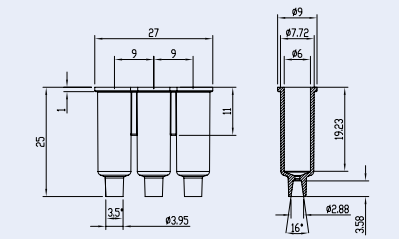


Fig. 364: 500 μl triple tank with Luer interface

Fig. 365: 500 μl triple tank – black

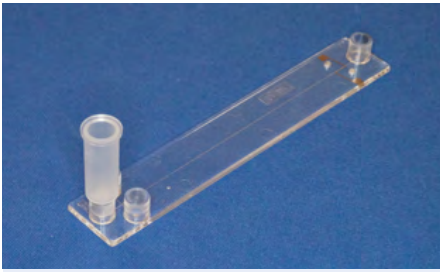


Fig. 366: 500 μl single tank mounted on Luer interface

Product Code	Description	Material	Price [€/10 pieces] 1+	10+	100+
16-0604-0387-09	Single tank Luer interface	PP	25.00	10.20	5.40
16-0605-0388-09	Double tank Luer interface	PP	26.00	11.80	5.80
16-0606-0389-09	Triple tank Luer interface	PP	27.00	12.40	6.10
16-0607-0387-09.1	Single tank Luer interface - black	PP - black	25.50	10.70	5.90
16-0608-0388-09.1	Double tank Luer interface - black	PP - black	26.50	12.30	6.30
16-0609-0389-09.1	Triple tank Luer interface - black	PP - black	27.50	12.90	6.60

8.2.1.3 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.

Product Code	Description	Material	Price [€/10 pieces] 1+	10+	100+
16-0628-0823-09	Single tank Luer interface – large opening – Fluidic 823	PP	27.00	12.40	6.10
16-0629-0824-09	Double tank Luer interface – large opening – Fluidic 824	PP	27.00	12.40	6.10
16-0630-0825-09	Triple tank Luer interface – large opening – Fluidic 825	PP	27.00	12.40	6.10
16-0631-0823-09.1	Single tank Luer interface – large opening – Fluidic 823 - black	PP	27.50	12.90	6.60
16-0632-0824-09.1	Double tank Luer interface – large opening – Fluidic 824 - black	PP	27.50	12.90	6.60
16-0633-0825-09.1	Triple tank Luer interface – large opening – Fluidic 825 - black	PP	27.50	12.90	6.60

8.2.1.4 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. With the embedded Luer interface, the tank can be easily mounted on chip. Furthermore, the cap can be equipped with a venting membrane in the Mini Luer interface allowing for a gas, but no liquid exchange.

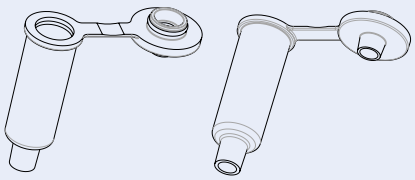


Fig. 367: Schematic drawing of tank Fluidic 639

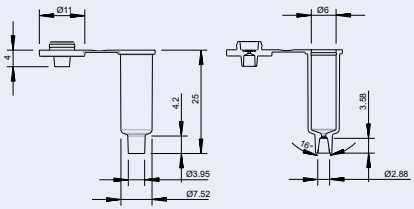


Fig. 368: Detail drawing of tank Fluidic 639 with Luer interface and cap

Product Code	Description	Material	Price [€/10 pieces]		
			1+	10+	100+
16-0618-0639-09	500 µl tank with Mini Luer cap - Fluidic 639	PP	25.00	10.20	5.40
16-0619-0639-09	500 µl tank with venting membrane in Mini Luer cap - Fluidic 639	PP	40.00	25.20	9.50

8.2.1.5 Tank 4.5 ml

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.

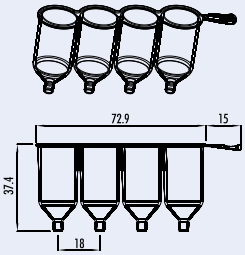


Fig. 369: Schematic tank layout – fluidic interface: male Luer

Fig. 370: Liquid reservoir: 4.5 ml tank

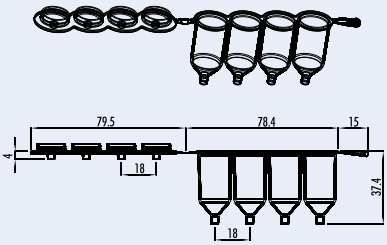


Fig. 371: Schematic tank layout with cap for pneumatic actuation

Fig. 372: Tank with cap for pneumatic actuation

Product Code	Description	Material	Price [€/10 pieces] 1+	10+	100+
16-0612-0232-09	Row of 4 tanks	PP	35.00	22.00	9.40
16-0613-0233-09	Row of 4 tanks with cap	PP	38.00	25.00	11.40

8.2.1.6 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. The fluidic interface is realized as male Luer connector.

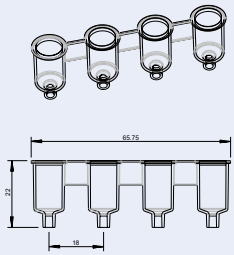


Fig. 373: 1 ml Tank with Luer interface – Fluidic 603

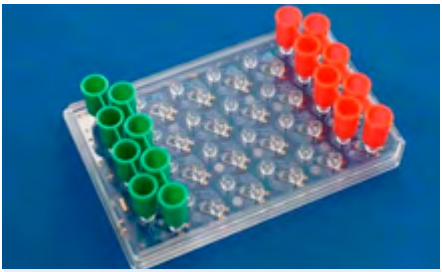


Fig. 374: 1 ml Tank with Luer interface mounted on microtiter plate for hydrostatic fluid management

Product Code	Description	Material	Price [€/10 pieces] 1+	10+	100+
16-0616-0603-09	Tank 1 ml – Row of four with Luer interface – green – Fluidic 603	PP	32.00	18.50	8.50
16-0617-0603-09	Tank 1 ml – Row of four with Luer interface – red – Fluidic 603	PP	32.00	18.50	8.50

8.2.1.7 Tank 200 µl with cap with Mini Luer interface

This tank version with a volume of 200 µl can be closed with a cap that has a Mini Luer interface either for liquid or air pressure supply or for venting purposes. With the embedded Luer interface, the tank can be easily mounted on chip. Furthermore, the cap can be equipped with a venting membrane in the Mini Luer interface allowing for a gas, but no liquid exchange.

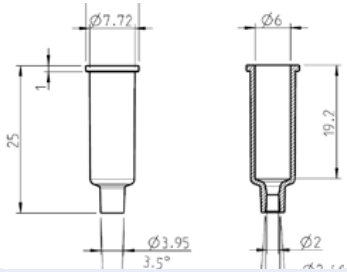


Fig. 375: Schematic drawing of tank Fluidic 823

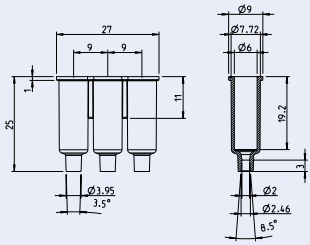


Fig. 376: 500 µl triple (Fluidic 825) and single tank (Fluidic 823)

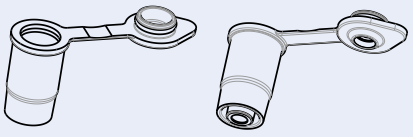


Fig. 377: Schematic drawing of tank Fluidic 833

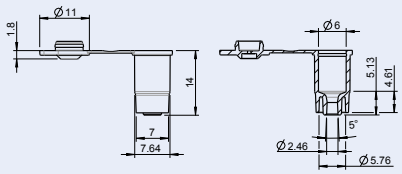


Fig. 378: Detail drawing of tank Fluidic 833 with Luer interface

Product Code	Description	Material	Price [€/10 pieces] 1+	10+	100+
16-0624-0833-09	200 µl tank with Mini Luer cap – Fluidic 833	PP	25.00	10.20	5.40
16-0625-0833-09	200 µl tank with Mini Luer cap with venting membrane – Fluidic 833	PP	40.00	25.20	9.50

8.2.1.8 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 Fluidik 234 or with pumps like Fluidik 235 allowing for various experimental settings.

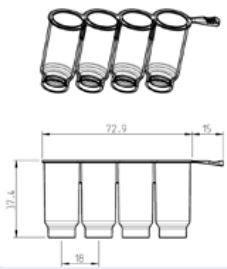


Fig. 379: Schematic drawing of Interaction Tank Fluidik 234

Fig. 380: Liquid reservoir: Interaction Tank Fluidik 234 – 4.5 ml volume

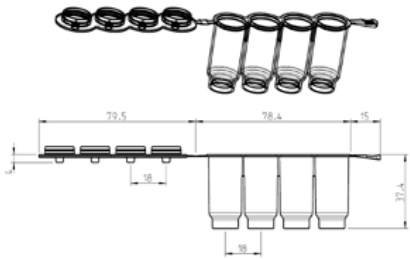


Fig. 381: Schematic drawing of Interaction Tank Fluidic 235

Fig. 382: Liquid reservoir: Interaction Tank Fluidic 235 – 4.5 ml volume

Product Code	Description	Material	Price [€/10 pieces] 1+	10+	100+
16-0622-0234-09	Interaction tank – row of four tanks – 4.5 ml volume, Fluidic 234	PP	35.00	22.00	9.40
16-0623-0235-09	Interaction tank – row of four tanks – 4.5 ml volume, Fluidic 235 – with cap	PP	35.00	22.00	9.40

8.2.2 Blister pouches

Blisters can be ordered as stand-alone parts being available with volumes ranging from 50-500 µm off the shelf.

The blisters from 50-350 µl volume can be operated with blister test chips 289 and 522, the 500 µl blister requires different test chips.

For the users, 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 either with dye (cyan, magenta, and yellow), water or user-specific liquids (to be provided to *microfluidic ChipShop*). Custom-filling services cost € 100,- additionally per blister order.

Product Code	Description	Blister volume [µl]	Price [€/blister] 1+	10+	100+
23-1916-0644-24	Blister pouch	50	8.20	5.80	2.95
23-1917-0645-24	Blister pouch	100	8.20	5.80	2.95
23-1918-0646-24	Blister pouch	150	8.20	5.80	2.95
23-1919-0647-24	Blister pouch	200	8.20	5.80	2.95
23-1920-0648-24	Blister pouch	250	8.20	5.80	2.95
23-1921-0649-24	Blister pouch	350	8.20	5.80	2.95
23-1922-0650-24	Blister pouch	500	8.20	5.80	2.95
23-1923-0000-00	Custom reagent filling service	-	100	-	-

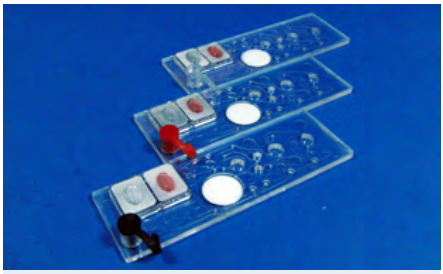


Fig. 383: Blister pouch with 25 µl liquid volume

Fig. 384: Blister pouch with 150 µl liquid volume

Fig. 385: DNA analysis chip with blister and integrated lateral flow strip

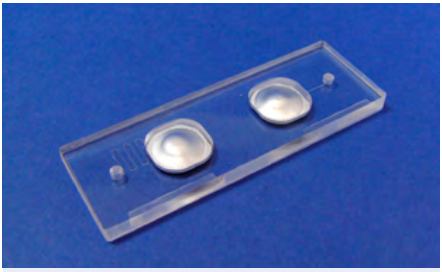


Fig. 386: Blister test chip with aluminum foil pouches

8.2.3 Liquid handling & reservoir – Pipette-Chip-Bridge

The special Pipette-Chip-Bridge combines the 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.

All chips having a female Luer interface as fluidic interface on chip can be used with these devices.

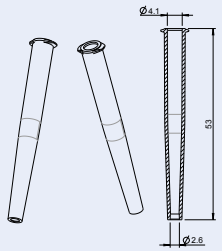


Fig. 387: Pipette-Chip-Bridge (Fluidic 569)

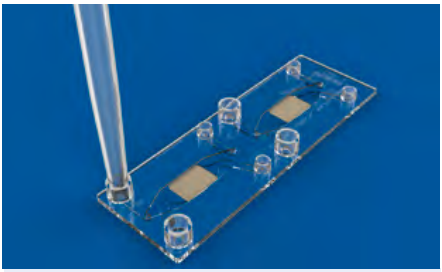


Fig. 388: Pipette-Chip-Bridge (Fluidic 569) mounted on Luer interface of the cross-flow membrane chip Fluidic 568

Product Code	Description	Material	Price [€/10 pieces] 1+	10+	100+
16-0634-0569-09	Pipette-Chip-Bridge, Fluidic 569	PP	25.00	10.20	5.40

8.3 Sampling vessels

Liquid or dry sample take up is a critical element not only in microfluidics. The sampling vessels allow for dry and liquid sample take up.

8.3.1 Sampling vessels without septum

A piercable aluminum tape can be used to close the sampling vessel at its bottom. Either liquid can be pipetted inside or a vessel prefilled with buffer can be used in which a swab is introduced after a sample take up.

A male Luer interface acts as fluidic interface. The sampling vessel can be mounted on female Luer interfaces on chip. The aluminum tape is pierced via embedded needles in the female Luer interface of specially designed chips.

On top of the sampling vessel a cap with embedded thread and O-ring ensures a liquid-tight sealing.

The total volume is 6.5 ml.

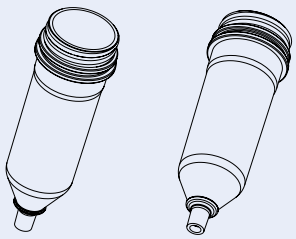


Fig. 389: Schematic drawing of sampling vessel

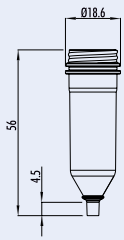


Fig. 390: Detail of sampling vessel

Fig. 391: Sampling vessel prefilled with liquid mounted on a chip

Fig. 392: Sampling vessel prefilled with buffer and inserted swab

Product Code	Description	Material	Price [€/10 pieces] 1+	10+
16-0620-0275-09	Sampling vessel 6.5 ml	PP	72.60	48.40

8.3.2 Sampling vessels with integrated septum

An integrated needle piercable and self-healing septum is integrated in the sampling vessel interface to the microfluidic chip. The sampling vessels with integrated septum allow for a safe sampling, interfacing with a Luer on a microfluidic chip and the removal of the sampling vessel from the chip after transfer of a certain amoutn of sample on chip. A needle embedded on chip allows the liquid transfer from the septum on the chip. After the removal of the sampling vessel from the chip not liquid can pour out from the septum. An additional cap to close the Luer interface of the septum further ensures that contamination cannot occur.

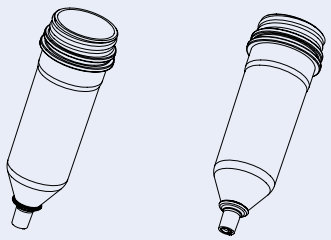


Fig. 393: Schematic drawing of sampling vessel with septum 276

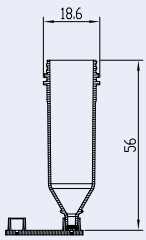


Fig. 394: Detail of sampling vessel with septum 276 with counterpart on chip

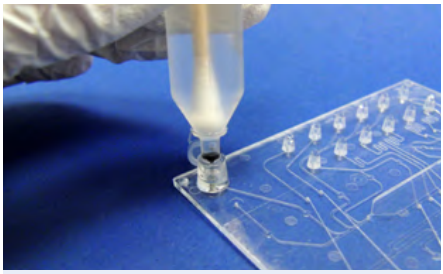


Fig. 395: Sampling vessel with septum on piercing interface on chip

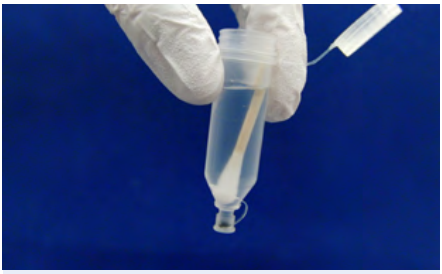


Fig. 396: Sampling vessel prefilled with buffer and inserted swab

Product Code	Description	Material	Price [€/10 pieces] 1+	10+
16-0621-0276-09	Sampling vessel 6.5 ml with septum	PP	92.60	58.40

8.4 Valving

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. A large variety of *microfluidic ChipShop's* valving increases the possibilities to do this and can adapt to the user's experimental design.

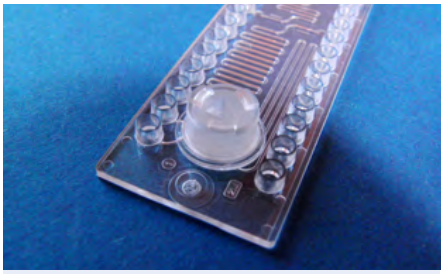


Fig. 397: Fluidic chip with embedded rotary valve

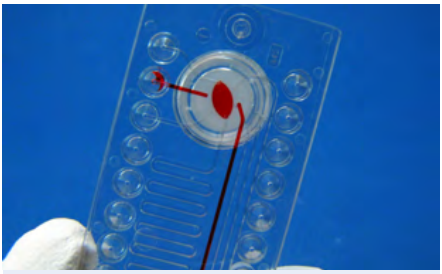


Fig. 398: Rotary valve with metering function

Product Code	Description	Lid Thickness [µm]	Material	Price [€]/chip 1+	10+
19-1850-0155-03	Turning valve test chip	175	PC	128.50	79.60
19-1851-0155-05	Turning valve test chip	188	Zeonor	128.50	79.60

8.5 Tubing

8.5.1 Capillary PEEK tubing

The capillary PEEK tubing is intended to be used with the Upchurch Nanoports but is also suited for various other applications. One package contains 10 capillaries with a length of 12″ (30.48 cm).

Fig. 399: Capillary PEEK tubing

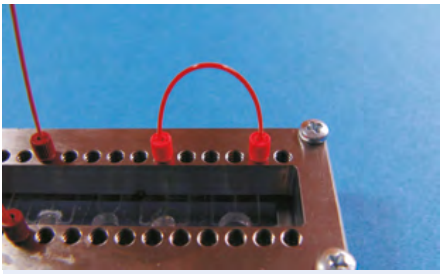


Fig. 400: Capillary PEEK tubing in use with nuts of the Upchurch Nanoport set in combination with a chip adapter frame

Product Code	Description	Material	Price [€/11 feet] 1+
29-0530-0000-12	Capillary PEEK tubing 1575-12x OD: 795 µm (0.0313″), ID: 200 µm (0.008″)	PEEK	60.10

8.5.2 PTFE tubing

PTFE tubings are standard tubings to connect pumps with the 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 [€]
29-0803-0000-16	Micro tubes, PTFE, ID × OD 0.5 mm × 1.0 mm	PTFE	1 m	8.50

8.5.3 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 the chips and on the olives being part of the Mini Luer fluid connectors.

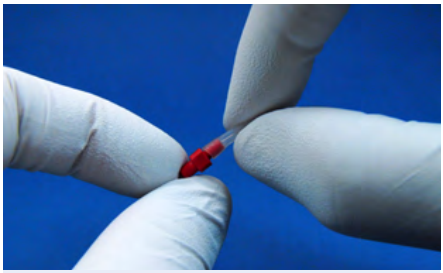


Fig. 401: Silicone sleeve mounted on a male Mini Luer fluid connector

Fig. 402: PTFE tube connected via silicone sleeves to Mini Luer fluid connector

Product Code	Description	Quantity	Price [€]
29-0610-0000-08	Silicone tube, ID: 0.76 mm, OD: 1.65 mm	1 m	8.10
29-0611-0000-08	Silicone tube, ID: 0.5 mm, OD: 2.5 mm	1 m	8.42

8.6 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.

For further microfluidic kits, please have a look at our selection in Chapter 13.1.

Fig. 403: Microfluidic support kit 1

Fig. 404: Chip-PCR support kit 1

Product Code	Kit Type	Product Description	Product Code	Price [€/kit]
11-0800-0000-00	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 (3) - Single-use syringes (10 ml, 3) - Syringe adapter (3)	29-0611-0000-08 29-0803-0000-16 11-0801-0000-00 11-0804-0000-00 11-0805-0000-00	27.80
11-0850-0000-00	PCR 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) - mcs-oil-04 - mcs-foil 007 (3 sheets)	29-0611-0000-08 29-0803-0000-16 11-0801-0000-00 20-5004-0000-00 10-0692-0000-00	32.90

8.7 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.

8.7.1 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 frames has the standard skirt of the microtiter plate, the second one is version with 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. 405: Handling frame

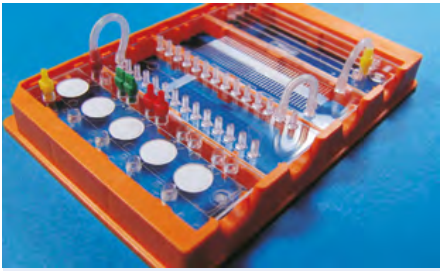


Fig. 406: Handling frame with different chip types connected with each other

Product Code	Description	Color	Price [€] 1+	5+	100+
15-4000-0000-12	Handling frame with high skirt	Yellow	22.00	15.00	12.40
15-4001-0000-12	Handling frame with high skirt	Orange	22.00	15.00	12.40
15-4002-0000-12	Handling frame with high skirt	Red	22.00	15.00	12.40

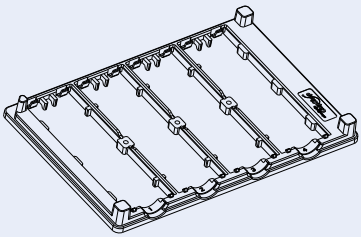


Fig. 407: Shematic drawing of handling frame with flat skirt

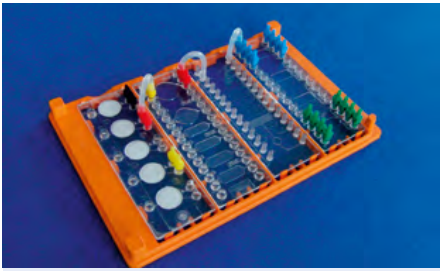


Fig. 408: Handling frame with flat skirt with different chip types connected with each other

Product Code	Description	Color	Price [€] 1+	10+	100+
15-4003-0000-12	Handling frame with reduced skirt height	Orange	22.00	15.00	12.40

8.7.2 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.

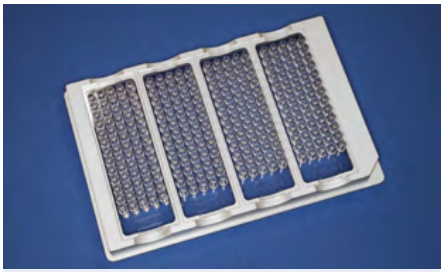


Fig. 409: Handling frame for microscopy slide format chips to fit 384 well positions of a microtiterplate – fitting with 384 well plate readers

Product Code	Description	Price [€] 1+
15-4004-0000-00	Handling frame to comply with the spacing of 384 microtiter plates	128.50

8.7.3 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.

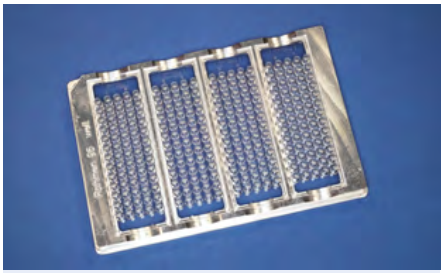


Fig. 410: Handling frame for microscopy slide format chips to fit 96 well positions of a microtiterplate – fitting with 96 well plate readers

Product Code	Description	Price [€] 1+
15-4005-0000-00	Handling frame to comply with the spacing of 96 microtiter plates	128.50

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

The handling frame for self-sealing and releasable chips allows for the insertion of a bottom plate e.g. a microscopy glass slide and a slide-format microfluidic chip. By closing the frame a constant pressure is ensured to connect the sealing gasket as the microfluidic chip liquid tight to the bottom plate.

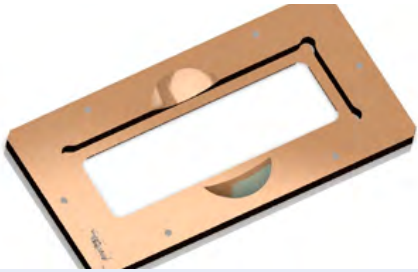


Fig. 411: Handling frame for self-sealing and releasable chips in slide-format

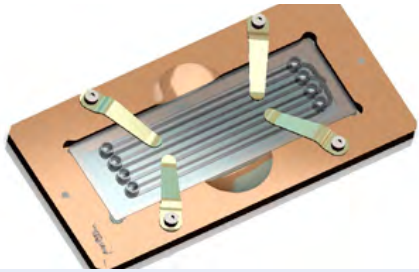


Fig. 412: Handling frame with chip – self-sealing and releasable chips

Product Code	Description	Price [€] 1+	5+
22-4505-0000-80	Handling-frame for self-sealing and releasable chips in slide-format	244.00	204.00

8.8 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.

8.8.1 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. 413: Chip lid Fluidic 854 – For microtiter plate-sized devices

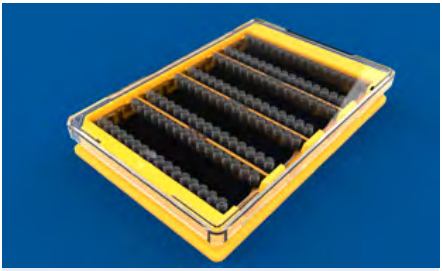


Fig. 414: Chip lid Fluidic 854 with handling frame and slide-sized microfluidic devices

Product Code	Description	Material	Price [€/10 pieces] 1+	10+
31-8100-0854-02	Chip lid Fluidic 854 – For microtiter plate-sized devices	Topas	32.10	19.95
31-8101-0854-07	Chip lid Fluidic 854 – For microtiter plate-sized devices	PS	32.10	19.95

8.9 Reagents

In order to enable a convenient use of our microfluidic systems, reagents are offered to fulfill special requirements. This includes for instance reagents usable with different polymer materials offered in the catalogue or being compatible with reactions carried out on chip.

8.9.1 Oil

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.

Product Code	Description	Material compatibility	Application	Price [€/10 ml]
20-5002-0000-00	mcs-oil-02	PC	PCR compatible	28.50
20-5004-0000-00	mcs-oil-04	PC, PMMA, COC (Topas), COP (Zeonor)	PCR compatible	35.40
20-5005-0000-00	mcs-oil-10	PC, PMMA, COC (Topas), COP (Zeonor)	Droplet generation	22.40

8.10 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.

Two storage box types are available. Both allow for an easy uptake of the chip by sliding the top cover. One box type allows for the storage of microfluidic devices in the size of a microscopy slide with thickness ranging from 1 – 2 mm, the other option copes with thicker devices from 3 to 4 mm thickness.

8.10.1 Storage & transport: Boxes for microfluidic devices – Chip size: Slide format

For chips in the format of a microscopy slide, three storage box types are available. 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.
A smaller 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.

Fig. 415: Microfluidic chip storage box Fluidic 832 for slide-format chips

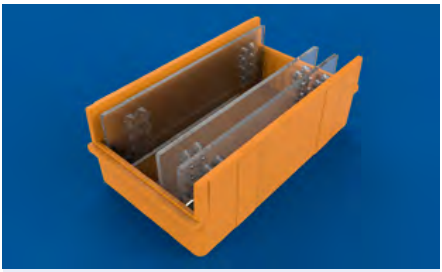


Fig. 416: Microfluidic chip storage box Fluidic 832 for slide-format chips – bottom part with chips

Product Code	Description	Material	Price [€/Box] 1+	10+
25-2003-0832-09	Microfluidic chip storage box For chip formats: Microscopy slide format (25.5 mm x 75.5 mm) For chip thicknesses: 1.0 – 2.0 mm Capacity: 5 chips without fluidic interfaces like Mini Luer, 10 chips without fluidic interfaces or through holes only Color: Opaque	PP	17.10	11.90

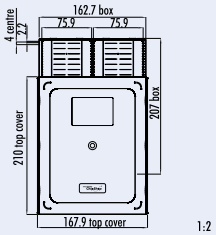


Fig. 417: Microfluidic chip storage box for devices with 1.0 – 2.0 mm thickness

Fig. 418: Microfluidic chip storage box for devices with 1.0 – 2.0 mm thickness

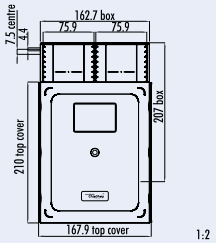


Fig. 419: Microfluidic chip storage box for devices with 3.0 – 4.0 mm thickness

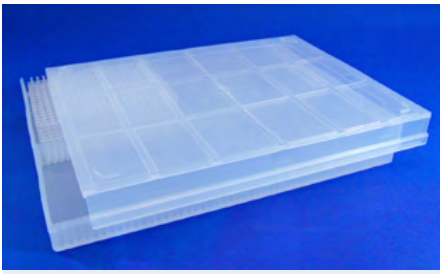


Fig. 420: Microfluidic chip storage box for devices with 3.0 – 4.0 mm thickness

Product Code	Description	Price [€/Box] 1+	10+
25-2000-0000-09	Microfluidic chip storage box **For chip formats:** Microscopy slide format (25.5 mm x 75.5 mm) **For chip thicknesses:** 1.0 –2.0 mm **Color:** Orange	19.10	12.90
25-2001-0000-09	Microfluidic chip storage box **For chip formats:** Microscopy slide format (25.5 mm x 75.5 mm) **For chip thicknesses:** 3.0 – 4.0 mm **Color:** Opaque	19.10	12.90

8.10.2 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. 421: Microfluidic chip storage box Fluidic 811 for for microfluidic chips sized 16 mm x 95 mm

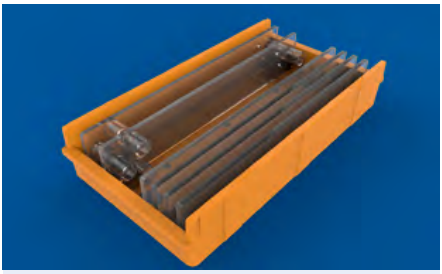
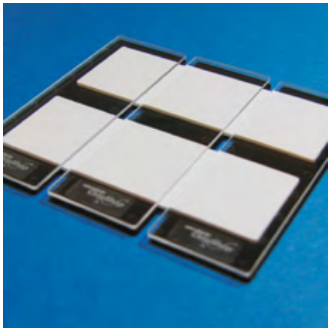
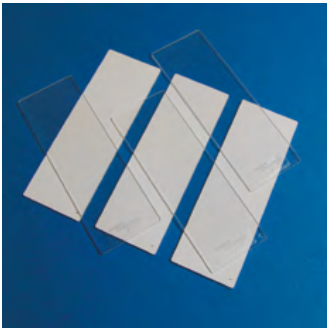


Fig. 422: Microfluidic chip storage box Fluidic 811 for micro-fluidic chips sized 16 mm x 95 mm – bottom part with chips

Product Code	Description	Material	Price [€/Box] 1+	10+
25-2002-0811-09	Microfluidic chip storage box For chip formats: Extended size I platform format (16 mm x 95 mm) For chip thicknesses: 1.0 – 2.0 mm Capacity: 5 chips without fluidic interfaces like Mini Luer, 10 chips without fluidic interfaces or through holes only Color: White	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 the microscopy-slide, the ¼-microtiterplate (43 mm x 64 mm) or round substrates with a diameter of 115 mm. Wafers, to be used, for instance, as substrates for hot embossing, come in several units in one package. If surface quality matters, each wafer is separately packaged.

The dimensions of the substrates may differ in the range of 0.5 % depending on the material.

If the material or the color you require is not listed, we are happy to provide you with a special quote for substrate for your material needs.

Besides the thicker polymer substrates in various formats special foil materials in different thickness are available.

9.1 Wafer format – 115 mm diameter

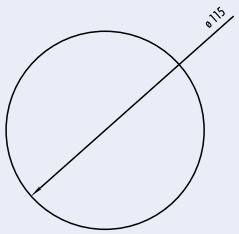


Fig. 423: Schematic drawing of 115 mm diameter wafer

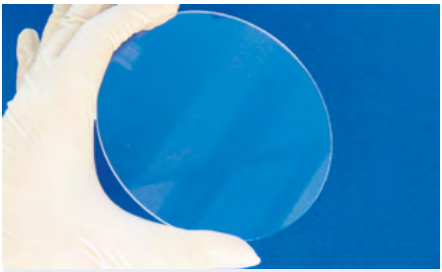


Fig. 424: 115 mm diameter wafer

Product Code	Material	Thickness [mm]	Comment	Price [€/per unit*] 1+	10+	50+
10-0646-0300-2.0-02	Topas	2.0	individually wrapped	75.00	62.00	36.00
10-0647-0300-2.0-03	PC	2.0		75.00	62.00	36.00
10-0648-0300-2.0-04	Zeonex	2.0		75.00	62.00	36.00
10-0649-0300-2.0-05	Zeonor	2.0		75.00	62.00	36.00
10-0656-0300-1.5-02	Topas	1.5	individually wrapped	75.00	62.00	36.00
10-0657-0300-1.5-03	PC	1.5		75.00	62.00	36.00
10-0658-0300-1.5-04	Zeonex	1.5		75.00	62.00	36.00
10-0659-0300-1.5-05	Zeonor	1.5		75.00	62.00	36.00

* 1 unit consists of 10 wafers

9.2 Wafer format – 180 mm diameter

Product Code	Material	Thickness [mm]	Comment	Price [€/per unit*] 1+	10+	50+
10-0710-0657-1.0-02	Topas	1	individually wrapped	120.00	98.00	55.00
10-0711-0657-1.0-05	Zeonor	1		120.00	98.00	55.00
10-0712-0657-2.0-02	Topas	2	individually wrapped	120.00	98.00	55.00
10-0713-0657-2.0-05	Zeonor	2		120.00	98.00	55.00
10-0714-0657-3.0-02	Topas	3	individually wrapped	130.00	106.00	59.00
10-0715-0657-3.0-05	Zeonor	3		130.00	106.00	59.00
10-0716-0657-4.0-02	Topas	4	individually wrapped	130.00	106.00	59.00
10-0717-0657-4.0-05	Zeonor	4		130.00	106.00	59.00
10-0718-0657-5.0-02	Topas	5	individually wrapped	140.00	114.00	63.00
10-0719-0657-5.0-05	Zeonor	5		140.00	114.00	63.00
10-0720-0657-6.0-02	Topas	6	individually wrapped	140.00	114.00	63.00
10-0721-0657-6.0-05	Zeonor	6		140.00	114.00	63.00

* 1 unit consists of 10 wafers

9.3 Microtiter plate format (127.76 x 85.48 mm)

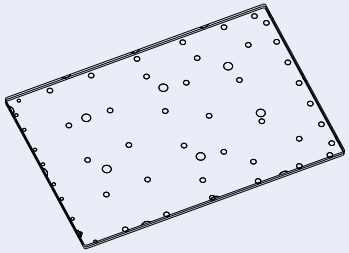


Fig. 425: Schematic drawing of substrate in microtiterplate format

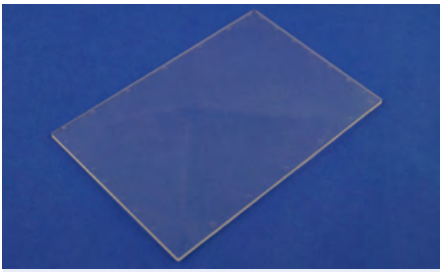


Fig. 426: Polymer substrate – microtiter plate format

Product Code	Material	Thickness [mm]	Comment	Price [€/per unit*] 1+	10+	50+
10-0702-0269-1.5-02	Topas	1.5	individually wrapped	75.00	62.00	36.00
10-0703-0269-1.5-05	Zeonor	1.5	individually wrapped	75.00	62.00	36.00
10-0704-0269-2.0-02	Topas	2	individually wrapped	75.00	62.00	36.00
10-0705-0269-2.0-05	Zeonor	2	individually wrapped	75.00	62.00	36.00
10-0706-0269-2.5-02	Topas	2.5	individually wrapped	75.00	62.00	36.00
10-0707-0269-2.5-05	Zeonor	2.5	individually wrapped	75.00	62.00	36.00
10-0708-0269-3.0-02	Topas	3	individually wrapped	75.00	62.00	36.00
10-0709-0269-3.0-05	Zeonor	3	individually wrapped	75.00	62.00	36.00

* 1 unit consists of 10 substrates

9.4. Microscopy slide format (75.5 mm x 25.5 mm)

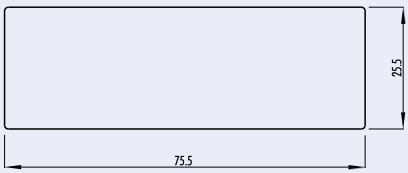


Fig. 427: Schematic drawing of the slide substrate

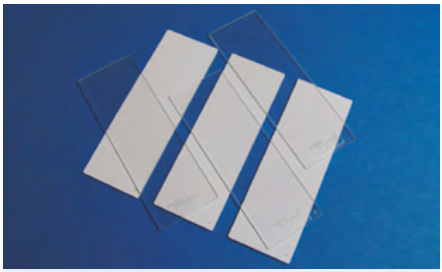


Fig. 428: Various polymeric substrates in the format of a microscopy slide

Product Code	Material	Thickness [mm]	Comment	Price [€/per unit*] 1+	10+	50+
10-0671-0349-1.0-01	PMMA	1.0	Individually wrapped	55.00	30.00	22.00
10-0665-0349-1.0-01.1	PMMA black	1.0	Individually wrapped	55.00	30.00	22.00
10-0662-0349-1.0-02	Topas	1.0	Individually wrapped	55.00	30.00	22.00
10-0663-0349-1.0-03	PC	1.0	Individually wrapped	55.00	30.00	22.00
10-0664-0349-1.0-04	Zeonex	1.0	Individually wrapped	55.00	30.00	22.00
10-0672-0349-1.0-05	Zeonor	1.0	Individually wrapped	55.00	30.00	22.00
10-0676-0349-1.0-05.1	Zeonor black	1.0	Individually wrapped	55.00	30.00	22.00
10-0673-0347-1.5-01	PMMA	1.5	Individually wrapped	55.00	30.00	22.00
10-0675-0347-1.5-02	Topas	1.5	Individually wrapped	55.00	30.00	22.00
10-0666-0347-1.5-03	PC	1.5	Individually wrapped	55.00	30.00	22.00
10-0667-0347-1.5-04	Zeonex	1.5	Individually wrapped	55.00	30.00	22.00
10-0674-0347-1.5-05	Zeonor	1.5	Individually wrapped	55.00	30.00	22.00

Product Code	Material	Thickness [mm]	Comment	Price [€/per unit*] 1+	10+	50+
10-0677-0347-2.0-01	PMMA	2	Individually wrapped	55.00	30.00	22.00
10-0678-0347-2.0-02	Topas	2	Individually wrapped	55.00	30.00	22.00
10-0679-0347-2.0-03	PC	2	Individually wrapped	55.00	30.00	22.00
10-0700-0347-2.0-04	Zeonex	2	Individually wrapped	55.00	30.00	22.00
10-0701-0347-2.0-05	Zeonor	2	Individually wrapped	55.00	30.00	22.00
10-0668-0304-4.0-02	Topas	4	Individually wrapped	75.00	35.00	22.00
10-0669-0304-4.0-03	PC	4	Individually wrapped	75.00	35.00	22.00
10-0670-0304-4.0-04	Zeonex	4	Individually wrapped	75.00	35.00	22.00

* 1 unit consists of 10 slides

9.5 Double slide format (75.5 mm x 50 mm)

Product Code	Material	Thickness [mm]	Comment	Price [€/per unit*] 1+	10+	50+
10-0722-0738-2.0-01	PMMA	2.0	Individually wrapped	76.00	44.50	24.90
10-0723-0738-2.0-02	Topas	2.0	Individually wrapped	76.00	44.50	24.90
10-0724-0738-2.0-03	PC	2.0	Individually wrapped	76.00	44.50	24.90
10-0725-0738-2.0-05	Zeonor	2.0	Individually wrapped	76.00	44.50	24.90

* 1 unit consists of 10 slides

9.6 Foils

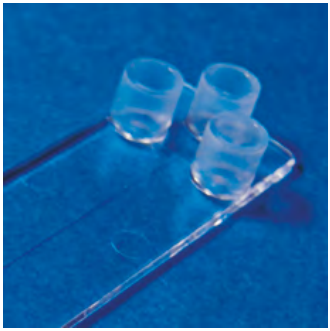
For special requirements thin foils in various materials are offered. This includes pure polymer foils as well as pressure sensitive adhesive tapes.

Special formats or the width of the foil can vary depending on their availability. If different from catalogue statements the respective changes will be communicated.

Product Code	Description	Material	Format [mm]	Tg [°C]	Thickness [µm]	Price [€/m²] 1+	5+	10+
10-0680-0000-05	mcs-foil-005	Zeonor	Roll format, width = 24.5*, 30*, 85, 450	136	188	120.00	104.00	98.00
10-0681-0000-05	mcs-foil-015	Zeonor	Roll format, width = 24.5*, 30*, 85	136	100	120.00	104.00	98.00
10-0683-0000-05	mcs-foil-049	Zeonor	Roll format, width = 24.5*, 85	136	40	110.00	94.00	88.00
10-0685-0000-02	mcs-foil-029	Topas	Roll format, width = 600	78	240	78.00	52.50	38.50
10-0691-0000-02	mcs-foil-081	Topas	Roll format, width = 85	142	175	78.00	52.50	38.50
10-0686-0000-02	mcs-foil-011	Topas	Roll format, width = 95, 600	78	140	78.00	52.50	38.50
10-0688-0000-02	mcs-foil-080	Topas	Roll format, width = 85, 900	142	125	78.00	52.50	38.50
10-0689-0000-02	mcs-foil-079	Topas	Roll format, width = 85, 900	142	100	78.00	52.50	38.50
10-0690-0000-02	mcs-foil-077	Topas	Roll format, width = 85, 900	142	50	78.00	52.50	38.50
10-0687-0000-00	mcs-foil-008	Double sided pressure sensitive adhesive tape	Roll format, width = 140	-	140	89.50	63.70	51.40

Length of minimal order is 1 m. For any deviation from standard roll width surcharge for customized cutting need to be charged individually.
* length of minimal order = 5 m


SYSTEM 1




ChipGenie

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 comes 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 E, 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.

ChipGenie® edition I is a merger of lab-automation and microfluidics. The microfluidic actuation and reagent supply is covered by a pipetting unit.

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 allow 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. Some of the instruments cover the temperature control only, others include the optical read-out allowing e.g. for real-time PCR.

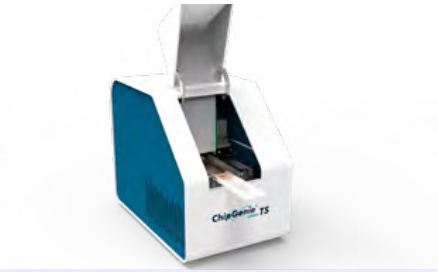


Fig. 429: ChipGenie® edition TS

10.1.1 ChipGenie® edition TS and ChipGenie® edition TSO

The ChipGenie® edition TS and ChipGenie® edition TSO instruments allow for the temperature control of microfluidic chips in the microscopy 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 equipped with a fluorescence-based read-out unit to carry out the optical detection on *microfluidic ChipShop's* platform chips following the spacing of a 384 well plate of 4.5 mm with fixed read-out positions.

Product Code	Description	Price [€]
08-8500-0000-00	ChipGenie® edition TS: Heating & PCR-system for microfluidic chips in the format of a microscopy slide	4,258.00
08-8501-0000-00	ChipGenie® edition TSO: Heating & PCR-system for microfluidic chips in the format of a microscopy slide with fluorescence read-out unit (two colors)	8,487.00

10.1.2 Multiple heater set-up & continuous-flow-PCR

10.1.2.1 ChipGenie® edition TS-3Z and ChipGenie® edition TSO-3Z – the instrument platform

The ChipGenie® edition TS-3Z and 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.

Product Code	Description	Price [€]
08-8502-0000-00	ChipGenie® edition TS-3Z: Heating & PCR-system for microfluidic chips in the format of a microscopy slide with three temperature zones	7,498.00
08-8503-0000-00	ChipGenie® edition TSO-3Z: Heating & PCR-system for microfluidic chips in the format of a microscopy slide with three temperature zones including fluorescence read-out unit (two colors)	10,953.00

10.1.2.2 Continuous-flow-PCR – The microfluidic chips

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.

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.

Product Code	Lid Thickness [µm]	Material	Comments Design Channel Dimensions Width / Depth / Length	Price [€/chip]			
				1+	10+	100+	1000+
08-0470-0047-03	250	PC	15 cycles (1 inlet, 1 outlet) 500 µm / 100 µm / 810 mm	42.50	32.50	25.50	12.00
08-0471-0065-03	250	PC	36 cycles (2 inlets, 3 outlets) 220 µm / 100 µm / 1,257 mm	42.50	32.50	25.50	12.00
08-0480-0708-02	125	Topas	41 cycles (1 inlet, 1 outlet) 200 µm / 100 µm / 1,879 mm	42.50	32.50	25.50	12.00
08-0479-0708-03	250	PC	41 cycles (1 inlet, 1 outlet) 200 µm / 100 µm / 1,879 mm	42.50	32.50	25.50	12.00
08-0473-0243-03	250	PC	40 cycles (1 inlet, 1 outlet) 600 µm / 300 µm / 1,637 mm	42.50	32.50	25.50	12.00
08-0474-0243-05	188	Zeonor	40 cycles (1 inlet, 1 outlet) 600 µm / 300 µm / 1,637 mm	42.50	32.50	25.50	12.00

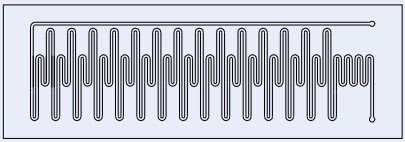


Fig. 430: Schematic drawing of 15-cycle continuous-flow PCR chip

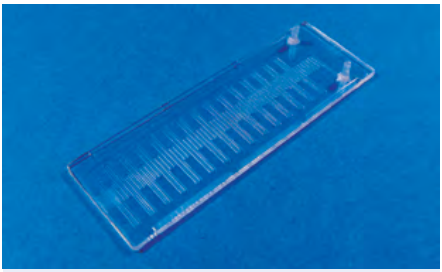


Fig. 431:15-cycle continuous-flow PCR-chip

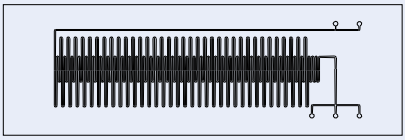


Fig. 432: Schematic drawing of 36-cycle continuous-flow PCR chip

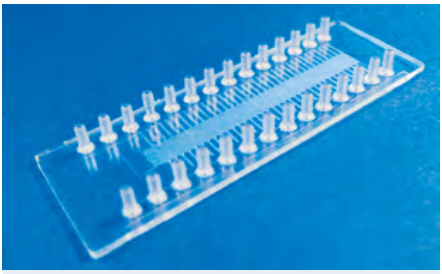


Fig. 433: 36-cycle continuous-flow PCR chip

Fig. 434: Schematic drawing of 41-cycle continuous-flow PCR chip

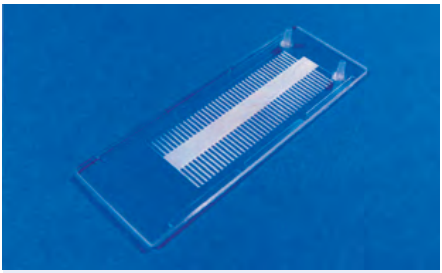


Fig. 435: 41-cycle continuous-flow PCR chip

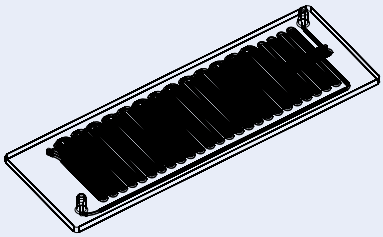


Fig. 436: Schematic drawing of 40 cycle continuous-flow PCR chip 243

Fig. 437: 40 cycle continuous-flow PCR chip 243

Fig. 438: Chip-PCR support kit

10.2 Capillary electrophoresis system with contactless conductivity detection – ChipGenie® edition E

ChipGenie® edition E is an extremely compact electrophoresis system that allows the label-free detection of small ions thanks to its capacitively coupled contactless conductivity detection (C4D) scheme. The extremely rugged instrument with the size of a cigar box contains a bipolar high-voltage supply for the separation of both anions and cations and a high-frequency detection circuit. It is controlled through an easy-to-use software program and is powered through its USB port. The instrument is complemented by a variety of chips ideally suited for the system. Applications include the analysis of foodstuffs, water, or other sources of small ions as well as larger molecules from biological samples.

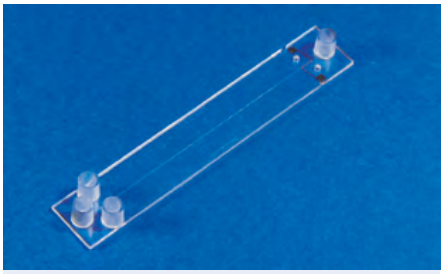


Fig. 439: Microfluidic chips for the ChipGenie® edition E series

Fig. 440: ChipGenie® edition E capillary electrophoresis unit

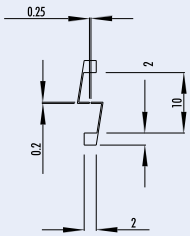


Fig. 441: Details of the electrodes

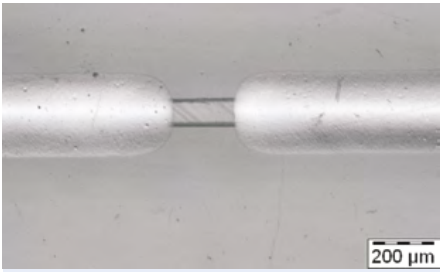


Fig. 442: Microscopy image of electrodes over microchannel

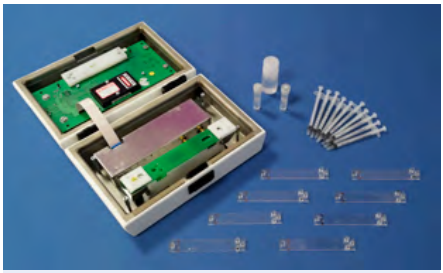


Fig. 443: ChipGenie® edition E – starter kit 1

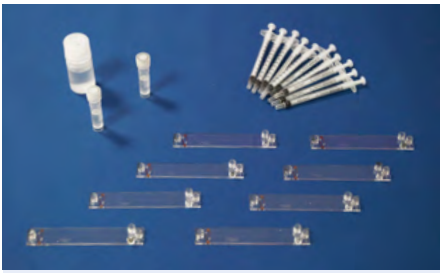


Fig. 444: ChipGenie® edition E – starter kit 2

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+
03-0110-0082-01	50	50	87.0	6.0	5.0	5.0	0	60	PMMA	125.00	85.00	32.50
03-0111-0201-01	50	50	87.0	6.0	5.0	5.0	0.1	60	PMMA	125.00	85.00	32.50
03-0798-0166-01	100	100	87.0	6.0	5.0	5.0	0	60	PMMA	125.00	85.00	32.50
03-0799-0166-05	100	100	87.0	6.0	5.0	5.0	0	50	Zeonor	125.00	85.00	32.50

Product Code	Description	Price [€/instrument]
08-0486-0000-00	*ChipGenie® edition E* instrument	3,780.00

Product Code	Description	Detail	Product Code	Price [€]
11-0827-0000-00	ChipGenie® edition E starter kit 1	- ChipGenie® edition E 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)	08-0486-0000-00 03-0110-0082-01 03-0111-0201-01 03-0798-0166-01 03-0799-0166-05 11-0809-0000-00 20-5061-0000-00 11-0829-0000-00	4,192.00
11-0828-0000-00	ChipGenie® edition E 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 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)	03-0110-0082-01 03-0111-0201-01 03-0798-0166-01 03-0799-0166-05 11-0809-0000-00 20-5061-0000-00 11-0829-0000-00	790.00

Product Code	Description	Detail	Product Code	Price [€]
11-0829-0000-00	ChipGenie® edition E kit 3 – standards	- Cation standard solution (Li^+ , Na^+, K^+) - Anion standard solution (Cl^-; NO_3^-, SO_4^{2-}) - Organic acid standard solution (tartaric acid, succinic acid, citric acid)		78.20

10.3 On-chip sample-preparation system – ChipGenie® edition P

ChipGenie® edition P is an instrument for on-chip sample preparation steps like DNA-extraction or cell lysis. The instrument in the size of a cigar box features a click–in holder frame for microscope slide format chips and contains a linearly moving magnet as well as a temperature control. The heating element as well as the permanent magnet is located underneath the chip as shown in Fig. 445. LED signals indicate the current operating status and a LCD display indicates the set temperature, alternatively the actual temperature. The arrangement of the switches provides a comfortable handling for pipetting in manual use. The instrument is a bench top instrument with a 5V DC power supply.

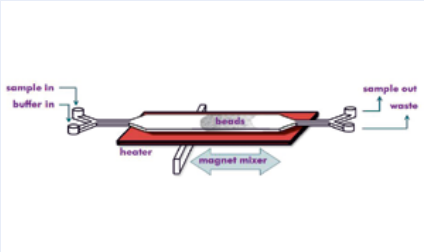


Fig. 445: Principle of a bead-based assay with the ChipGenie® edition P instrument

Fig. 446: ChipGenie® edition P instrument with bead-filled sample-prep chip

Product Code	Description	Price [€/instrument]
08-0487-0000-00	*ChipGenie® edition P* instrument	695.00

10.3.1 Chips eP1 – chips for ChipGenie® edition P

The chips highlighted below are suited to be run with the ChipGenie® edition P instruments.

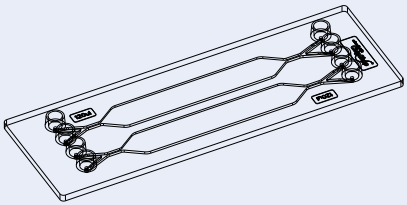


Fig. 447: Schematic drawing of the rhombic chamber chip

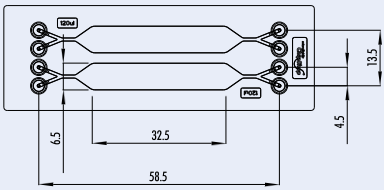


Fig. 448: Rhombic chamber chip – 120 µl chamber volume

Product Code	Chamber Volume [µl]	Chamber Depth [µm]	Lid Thickness [µm]	Material	Surface Treatment	Price [€/chip] 1+	10+	100+
12-0901-0172-01	120	500	175	PMMA	-	36.20	24.30	16.10
12-0902-0172-02	120	500	140	Topas	-	36.20	24.30	16.10
12-0903-0172-03	120	500	175	PC	-	36.20	24.30	16.10
12-0904-0172-05	120	500	188	Zeonor	-	36.20	24.30	16.10
12-1017-0172-07	120	500	125	PS	-	36.20	26.30	16.10
12-0905-0172-01	120	500	175	PMMA	hydrophilized	39.20	26.30	17.80
12-0906-0172-02	120	500	140	Topas	hydrophilized	39.20	26.30	17.80
12-0907-0172-03	120	500	175	PC	hydrophilized	39.20	26.30	17.80
12-0908-0172-05	120	500	188	Zeonor	hydrophilized	39.20	26.30	17.80
12-1018-0172-07	120	500	125	PS	hydrophilized	39.20	24.30	17.80

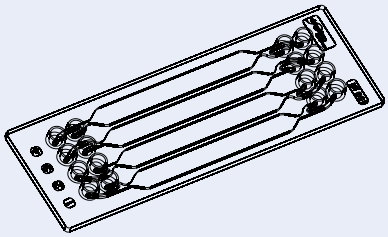


Fig. 449: Schematic drawing rhombic chamber chip

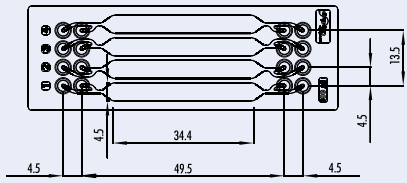


Fig. 450: Rhombic chamber chip – 100 µl chamber volume

Product Code	Chamber Volume [µl]	Chamber Depth [µm]	Lid Thickness [µm]	Material	Surface Treatment	Price [€/chip] 1+	10+	100+
12-0909-0221-01	100	600	175	PMMA	-	36.20	24.30	16.10
12-0910-0221-02	100	600	140	Topas	-	36.20	24.30	16.10
12-0911-0221-05	100	600	188	Zeonor	-	36.20	24.30	16.10
12-0912-0221-01	100	600	175	PMMA	hydrophilized	39.20	26.30	17.80
12-0913-0221-02	100	600	140	Topas	hydrophilized	39.20	26.30	17.80
12-0914-0221-05	100	600	188	Zeonor	hydrophilized	39.20	26.30	17.80

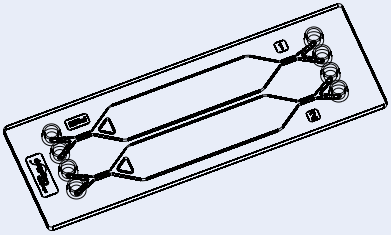


Fig. 451: Schematic drawing rhombic chamber chip

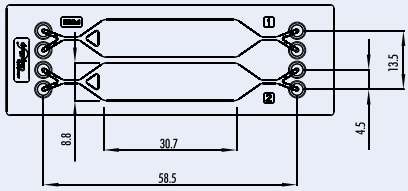


Fig. 452: Rhombic chamber chip – 250 µl chamber volume

Product Code	Chamber Volume [µl]	Chamber Depth [µm]	Lid Thickness [µm]	Material	Surface Treatment	Price [€/chip] 1+	10+	100+
12-0915-0194-01	250	800	175	PMMA	-	36.20	24.30	16.10
12-0916-0194-02	250	800	140	Topas	-	36.20	24.30	16.10
12-0917-0194-05	250	800	188	Zeonor	-	36.20	24.30	16.10
12-0918-0194-01	250	800	175	PMMA	hydrophilized	39.20	26.30	17.80
12-0919-0194-02	250	800	140	Topas	hydrophilized	39.20	26.30	17.80
12-0920-0194-05	250	800	188	Zeonor	hydrophilized	39.20	26.30	17.80

10.4 ChipGenie® I instrument – Pipetting & Read-out system

ChipGenie® I instrument offers pipetting of chips in the format of a microtiterplate with 1536 spacing. Microfluidic chips having the size of a microscopy slide can be fitted in respective microtiter plate sized handling frames to be handled with the pipettor.

A colorimetric read-out system is integrated in the **ChipGenie® I instrument** to cope with the detection of special detection spots addressed by the IFSA 1 Immunoassay Chip. Various other kinds of chips can be operated by this system.

The **ChipGenie® I instrument** is a merger of lab-on-a-chip and labautomation, liquid supply is managed by the pipettor, the liquid control on chip is ensured through the fluidic design.

As an example chips being used with the **ChipGenie® I instrument** the IFSA 1 Immunoassay Chip is shown below allowing for a frit-based sample enrichment and colorimetric detection.

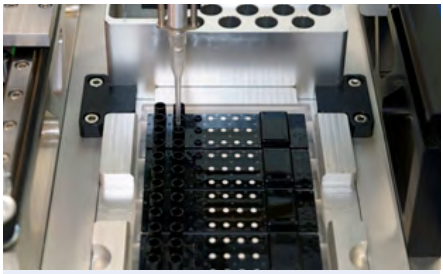


Fig. 453: Chips in microtiter sized handling frame placed in ChipGenie® edition I instrument

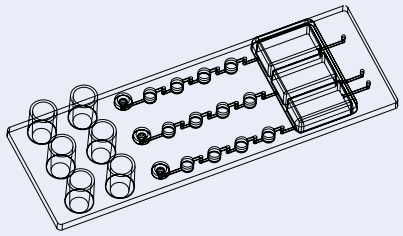


Fig. 454: Schematic drawing of IFSA 1 Immunoassay Chip – Fluidic 249

Product Code	Short product description	Product Description	Price [€]
08-0496-0000-00	ChipGenie® edition I instrument	Pipetting system with optical read-out e.g. for IFSA 1 Immunoassay Chips	14,240.00

Product Code	Embedded Frits	Functional Description	Chip Material	Price [€/chip]* 10+	100+
21-6006-0249-02	- Negative control - Positive control (anti POD) - Anti hapten 1 - Anti hapten 2	IFSA 1 Immunoassay Chip pre-equipped with two generic frits 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 [€]
20-5104-0000-00	IFSA 1 Immunoassay Chip Reagent Kit 1	IFSA 1 Immunoassay Chip Reagent Kit 1 – for 50 chips - Washing buffer - Substrate buffer - Conjugate (Streptavidin-HRP) - Trigger (TMB) - Hapten 1 (optional) - Hapten 2 (optional) - Sample Dilution Buffer - Antibody Stabilization Buffer	167.00
20-5105-0000-00	Standards for Demonstration kit 21-6010-0249-02	Standards for Demonstration kit 21-6010-0249-02 - CRP - Procalcitonin	64.50

10.5 ChipGenie® edition BD

For a quick evaluation of the emptying of blister and filling behavious, *microfluidic ChipShop's* blister driver ChipGenie® edition BD is at hand. The chips are inserted in the loader, the instrument positions of the blister correctly and a freely configurable emptying procedure can be performed. Visualisation takes place with an integrated camera.

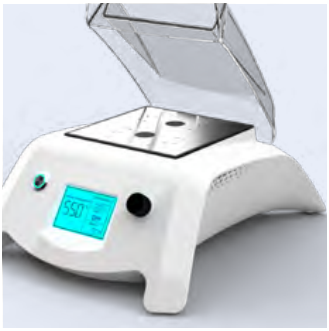
Product Code	Description	Price [€/instrument]
08-0497-0000-00	*ChipGenie edition® BD – Blister Driver instrument*	2.685,00

10.6 ChipGenie® edition TV

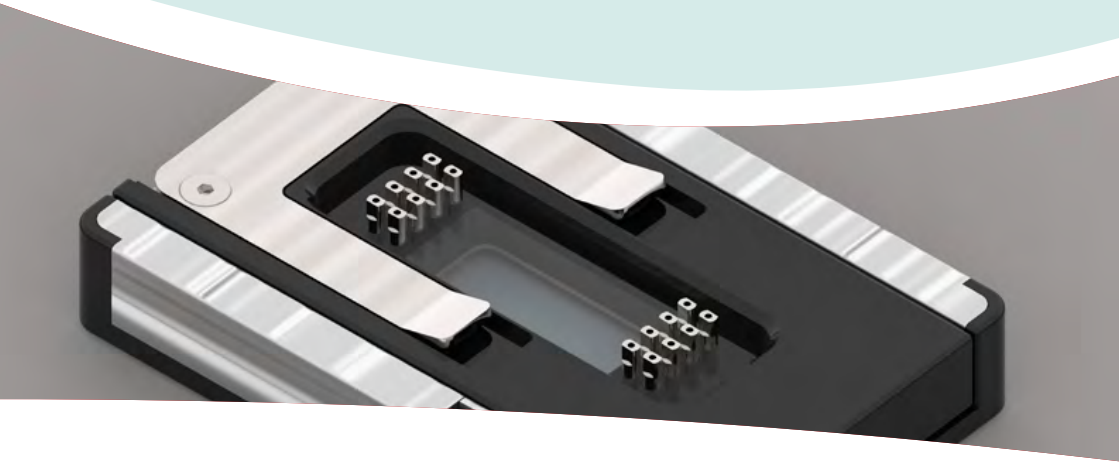
ChipGenie® edition TV allows a strict control of turning valves. The device rotates the valves and sets exactly the experimental time frame – when and how each valve should be positioned. Countless experimental set-ups can be generated by combining the wide variety of *microfluidic ChipShop´s* valves.

Product Code	Description	Price [€/instrument]
08-0498-0000-00	*ChipGenie edition® TV – Turning Valve instrument*	3.350,00


dropbot
Model DB3-120



11 Special instruments



Special instruments

This chapter compiles small instruments like incubators for cell-based assays or a dielectrophoresis unit. Furthermore, instruments from our partner companies are featured in this chapter.

11.1. Handling platforms and incubators

11.1.1 Lab-on-a-Chip Handling Platform / Cell Culture Incubator – LOC HP & LOC CCI

The Lab-on-a-Chip Handling Platform – LOC HP makes the connection to the interfaces easy. 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.

Through the fluidic interfaces, external pumps and valves can be connected through tubes with the microfluidic device with the microfluidic device without touching the device itself. The LOC HP may be upgraded into 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 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:

- CO_2-independent microfluidic cell culture assays
- Cell-based microscopy assays
- 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.
- For standard cell culture no additional gas incubation necessary.
- Cell culture is comparable to standard CO_2-incubator.
- Compatible with all standard microscopy slides and microfluidic chips in the format of a microscopy slide.
- 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 can be done manually with a pipette or with connected pumps. Open cavities should be closed with Mini Luer plugs (09-0551-0334-09) to avoid e.g. evaporation.

For glass microfluidic chips having no embedded fluidic interfaces the LOCHP/CC1 series is at hand.

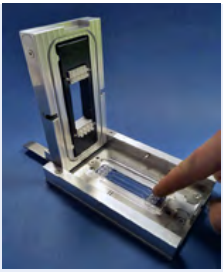


Fig. 455: Insertion of a microfluidic chip in the Lab-on-a-Chip Cell Culture Incubator – LOC CCI 1

Fig. 456: Lab-on-a-Chip Cell Culture Incubator – LOC CCI 1 placed on a microscopy stage

Product Code	Description	Price [€] included adapter plate 2x4	2x8	2x16
22-4500-0000-00	LOC-CCI 1 w/o heating elements (incl. 1 adapter plate of your choice)	1,370.00		
22-4501-0000-00	LOC-CCI 1 with heating elements (incl. 1 adapter plate of your choice)	1,875.00		
22-4503-0000-00	Additional adapter plate	390.00	390.00	390.00

Product Code	Description	Price [€] included adapter plate 2x4	2x8	2x16
22-4504-0000-00	LOC HP/CC1 – without heating elements – handling frame for glass chips (incl. one adapter plate of your choice)	1,370.00		
22-4502-0000-00	LOC HP/CC1 – with heating elements – handling frame for glass chips (incl. one adapter plate of your choice)	1,875.00		
22-4503-0000-00	Additional adapter plate	390.00	390.00	390.00

Product Code	Description	Detail	Product Code	Price [€]
11-0826-0000-00	LOC-CCI 1 starter kit 1	- Male Mini Luer plugs, red, material: PP (10)	09-0551-0334-09	638.32
		- Rhombic chamber chip, 120 µl chamber volume, 500 µm channel depth, hydrophilized, material: Topas (10)	12-0906-0172-02	
		- Rhombic chamber chip, 100 µl chamber volume, 600 µm channel depth, hydrophilized, material: Topas (10)	12-0913-0221-02	
		- Rhombic chamber chip, 250 µl chamber volume, 800 µm channel depth, hydrophilized, material: Topas (10)	12-0919-0194-02	
11-0844-0000-00	LOC-CCI 1 tool kit	- Mini Luer interfaces (16) - Screw ferrules (16) - Screw locks (8) - PEEK tube (1 m) - PTFE tube (1 m)	09-0573-0000-00 09-0574-0000-00 09-0575-0000-00 29-0530-0000-12 29-0803-0000-16	219.00

11.2 Dielectrophoresis system DEP

With this system, which comprises an 8-channel high frequency signal generator (DEP1) and a microfluidic chip (DFC1) with integrated electrodes (see Fig. 457), single suspension cells can be trapped (up to two at a time) in a laminar flow of a given aqueous solution without any physical contacts to solid objects.

An ensemble of eight microelectrodes (an electric field cage) produces a high-frequency electromagnetic field that acts on the cells and forces them with micrometer precision to a defined position in the micofluidic channel of the chip. The forces acting on the cells are sufficiently strong to maintain the position of the cell against the flow of the solution in the channel.

By adding a reagent of interest (ligands, antibodies, signal molecules etc.) to the solution, the cell can be exposed to the reagent with high temporal resolution while the cellular response to it can be monitored by optical microscopy. As tested under various experimental conditions, cell viability is maintained for hours, under optimal conditions even for up to days.

- Specifications DEP1: weight 360 g, size w x d x h = 18 cm x 9 cm x 5.5 cm
- The system comes with connecting cable for the electrical contacts.
- Fluid connection to the chip is realized by olive connectors with OD of 1.6 mm and ID 0.7 mm

Fig. 457: Dielectrophoresis system DEP consisting of high frequency signal generator DEP1, microfluidic chip DFC1 and connecting cable

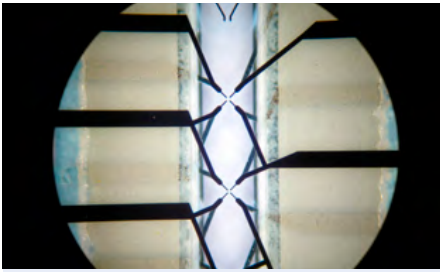


Fig. 458: Image of the field cage region of the chip DFC1

Product Code	Description	Price [€/instrument]
11-0866-0000-00	DEP1 High frequency signal generator for dielectrophoresis applications	2,843.75
11-0867-0000-00	DFC1 Dielectrophoresis chips. Set of 6 chips	1,875.00

11.3 DropBot – Digital microfluidic control system

DropBot by Sci-Bots is a portable, general-purpose **Digital Microfluidic** (DMF) 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
- Cell Culture (adherent, suspension, or 3D)

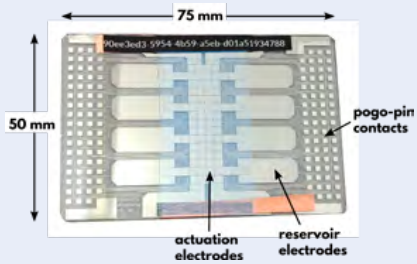


Fig. 459: Footprint and general layout of the generic glass Digital Microfluidic Chip

Fig. 460: DropBot instrument for manipulation and read-out

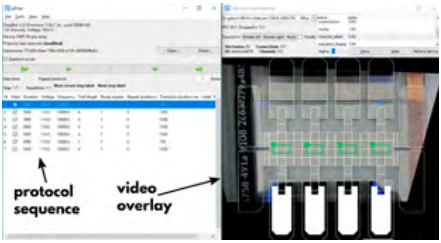


Fig. 461: MicroDrop – the Graphical User Interface

Product Code	Description	Price [€/instrument]
11-0888-0000-00	DropBot platform incl. µDrop software and 3 glass DMF chips	4,780.00

Product Code	Description	Price [€/10 pieces] 1+	10+
11-1167-0000-00	Generic glass DMF Chip	89.50	84.50

11.4 Active Microfluidic Mixing with MXR by Redbud Labs

MXR by Redbud Labs – Make any chamber a mixing chamber: MXR adds active mixing to microfluidic systems. Using a combination of pumping and chaotic advection, MXR gently agitates volumes from 1–100 µL. MXR is ideal for enhancing assays that are limited by mass transport, including:

- Hybridization and microarray incubation
- Mixing of liquids and resuspension of dried reagents
- Fluid exchange

MXR can be ordered pre-installed, or as a pop-in module. A simple peel-and-stick operation adds MXR to your chip.

MXR is powered by Redbud Posts – millions of flexible, magnetic micro-rods that act as tiny stirbars. To learn more about MXR and Redbud Post technology, visit redbudlabs.com.

11.4.1 MXR Drivers – The Redbud STAGE

For temperature controlled assays, Redbud Stage enables simultaneous mixing and incubation of up to two MXR-enabled chips, with additional room to pre-heat reagents and set aside non-mixing control chambers. As your assay develops, Redbud Labs can design customized inserts to fully integrate the drive system with your instrumentation. A smaller MXR driver for applications where the heated stage is not necessary is available. Kindly contact us for more information.

11.4.2 Customize any of microfluidic ChipShop's chips with MXR

Please contact us to learn how MXR can be customized to fit your application. MXR can be integrated into any of *microfluidic ChipShop's* wide variety of microfluidic solutions.

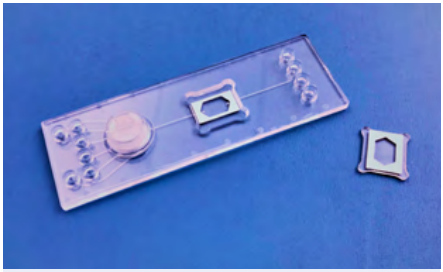


Fig. 462: Redbud Labs' MXR pillar-mixer integrated in microfluidic ChipShop's generic sensor platform (Fluidic 673)

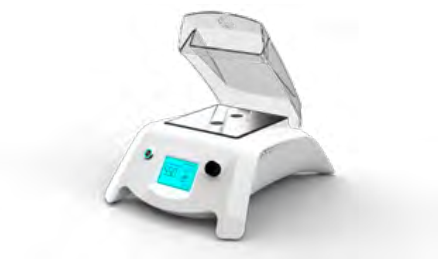


Fig. 463: Redbud Stage agitation and heating platform

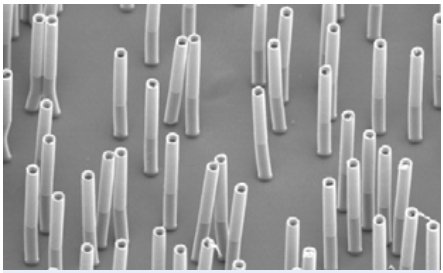
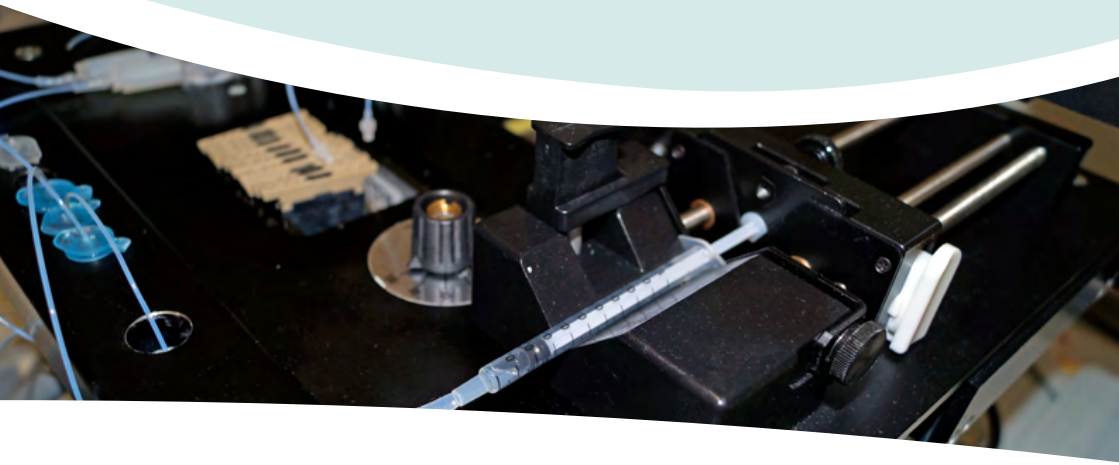


Fig. 464: MXR is powered by Redbud Posts

Product Code	Description	Price [€/instrument]
11-0889-0000-00	Redbud Stage	9,999.00
11-1168-0000-00	MXR for 14-1060-0673-** (any of microfluidic ChipShop's standard material)	44.00
	MXR customized for other microfluidic ChipShop chips	Contact us

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 Syringe pumps

The cetoni neMESYS syringe pumps are high-end syringe pumps for extremely precise dosing and pumping of fluids. The pumps can be easily controlled by the user-friendly software with a comfortable user interface.

Major benefits are that a) fluids can be pumped and sucked, b) the valve allows switching between sample taking and sample dosing, and c) the pumps operate nearly pulsation free.

The cetoni neMESYS syringe pumps always require a starter unit as basic module necessary for the control of the pumps and one or more pumping modules. A dosing module for up to 3 bar, a module for medium pressure up to 200 bar and a high pressure module for up to 510 bar are available to be combined with a base unit.

Fig. 465: cetoni neMESYS starter unit

Fig. 466: cetoni neMESYS dosing module

Fig. 467: cetoni neMESYS medium pressure module

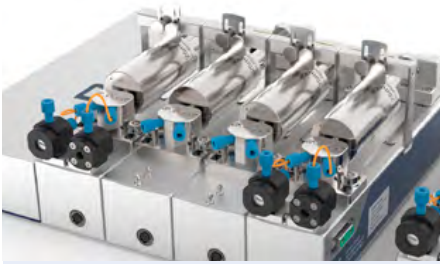


Fig. 468: Starter unit combined with several syringe pumps

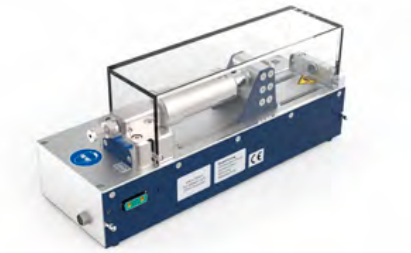


Fig. 469: cetoni neMESYS high pressure module V2

Fig. 470: Glass syringes for neMESYS low and mid pressure modules

Product Code	Description	Price [€/instrument]
11-0897-0000-00	BASE 120 - cetoni neMESYS base unit, power supply (120 W) for up to: - 8 low pressure modules - 5 medium pressure modules - 2 high pressure modules	
11-0894-0000-00	BASE 600 - cetoni neMESYS base unit, power supply (600 W) for: - more than 2 high pressure modules	please contact us
11-0898-0000-00	cetoni neMESYS dosing module for pressure up to 3 bar	
11-0947-0000-00	cetoni neMESYS dosing module for pressure up to 3 bar - gear 29:1	
11-0899-0000-00	cetoni neMESYS medium pressure module for pressure up to 200 bar	
11-0893-0000-00	cetoni neMESYS high pressure module V2 for pressure up 510 bar	
11-0895-0000-00	Connector kit for low pressure module: - 4 fittings ¼ 28-UNF - O-rings - tubing	

In order to ensure accurate dosing, high precision syringes are well suited with the highly precise pumps and the following sizes are thought for most of our applications. More high precision glass and metal syringes with volumes between 10 µl and 50 ml are available upon request.

Product Code	Description	Price [€/syringe]
11-0954-0000-00	cetoni high-precision glass syringe 1 ml with tubing connector ¼-28 UNF thread	
11-0955-0000-00	cetoni high-precision glass syringe 10 ml with tubing connector ¼-28 UNF thread	please contact us
11-0956-0000-00	cetoni high-precision glass syringe 2.5 ml with tubing connector ¼-28 UNF thread	
11-0957-0000-00	cetoni high-precision glass syringe 25 ml with tubing connector ¼-28 UNF thread	
11-0958-0000-00	cetoni high-precision glass syringe 5 ml with tubing connector ¼-28 UNF thread	
11-0959-0000-00	cetoni high-precision glass syringe 50 ml with tubing connector ¼-28 UNF thread	

12.2 MicCell Fluid Processor

The MicCell Fluid Processor system contains all macroscopic actuators that control liquid handling: syringe pump(s), macrovalves (either turn/selector valves or simple on/off valves), and/or the control electronics for hydrogel microvalve(s). It can be controlled by a graphics-oriented Windows software.

The picture shows the MicCell FP-1-1-standard Fluid Processor that contains a syringe pump with 3-way valve (left), a hydrogel valve control and a 2/2 macrovalve (middle) and a 4/1-selector valve (right). Other configurations are available.

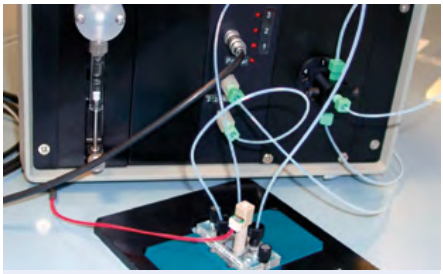


Fig. 471: MicCell FP-1-1-standard Fluid Processor. Foreground: MicCell with hydrogel valve in its blue support and black adapter plate

Product Code	System Type	Product description	Price [€/instrument]
08-0489-0000-00	MicCell FP-1-1-standard	1x syringe pump, 1x 1/4-selector valve, 1x 2/2-macrovalve, 1x hydrogel valve control	5,565.00
08-0490-0000-00	MicCell FP-2-0	2x syringe pumps (no 1/4-selector valve, no 2/2-macrovalve, no hydrogel valve control)	5,565.00
08-0491-0000-00	MicCell FP-2-1	2x syringe pumps, 1x 1/4-selector valve (no 2/2-macrovalve, no hydrogel valve control)	7,402.00
08-0492-0000-00	MicCell FC1 Software	For the interactive control of 1-8 syringe pumps	1,018.00

12.3 Hydrogel micro valves

The GeSiM hydrogel valves are small silicon chambers filled with hydrogel particles of defined size that dramatically shrink upon heating to more than 34°C, therefore opening the normally closed microvalves. Different valve designs are available, the standard PV6 valve being vertically flown through by the liquid. By mounting it inside a standard UNF fitting, a microfludic injector is obtained that controls an inlet channel of a branched (e.g. T/Y-shaped) MicCell fluid system. In an alternative design, the hydrogel valve is connected to a reservoir via a tube. The valve is controlled by an electronic module in the Fluid Processor.

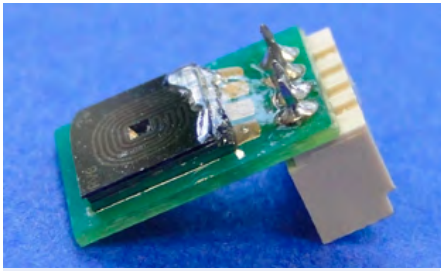


Fig. 472: PV6 hydrogel-containing silicon chip on a printed circuit board (top view)

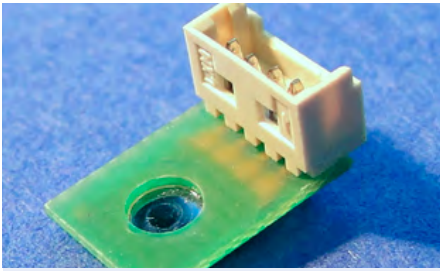


Fig. 473: PV6 hydrogel-containing silicon chip on a printed circuit board (bottom view)

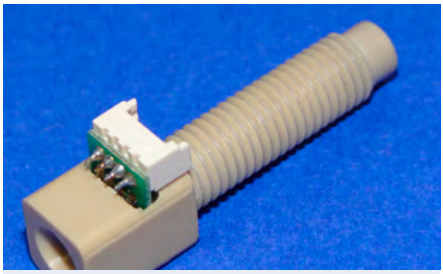


Fig. 474: PV6 injector, ready to use, in UNF 1/4-28 fitting

Product Code	Description	Features	Price [€/chip] 1+	5+	10+
07-461-0000-00	Hydrogel-Valve PV6, tube	Valve chip on PCB in PEEK fitting 1/4-28 UNF; inlet: Teflon tube OD=1.58 mm with Upchurch ferrule, electrical connector DC input 3.5 V/0.1 A	577.00	519.00	477.00
07-462-0000-00	Hydrogel-Valve PV6, injector	Valve chip on PCB in PEEK fitting 1/4-28 UNF; inlet: open funnel, electrical connector DC input 3.5 V/0.1 A	577.00	419.00	477.00

12.4 Cellix syringe 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 mini, iPod Touch, PC
- Ideal for microfluidics, shear stress, precision mixing and cell culture studies.

12.4.1 ExiGo™ Microfluidic Syringe Pump with iPad mini control

Features:

- Precise flow control with active feedback via integrated flow sensor.
- Flow rate: 10 nl/min – 20 ml/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.
- Includes iPad mini which can control/program up to 4 pump modules independently
- Wi-Fi communication
- Use standard tubing for connection to any microfluidic biochip.

Applications:

Microfluidics, precise multichannel mixing; electrophysiology; single cell analysis; analytical biochemistry; RNA/DNA analysis.

Fig. 475: ExiGo™ Pump, controlled by iPad mini

Fig. 476: iPad mini App for ExiGo™ pump showing sample volume to be dispensed from each pump

12.4.2 Kima Pump with iPod Touch control

Features:

- Fits inside standard CO_2 incubators – maintaining temp., humidity etc.
- Recirculating long term perfusion pump.
- Wash mode or pump mode
- Flow rate: 15 – 35 ml/hr ±4%
- Dead volume: < 300 µl
- Includes iPod Touch 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.

Applications:

Cell culture under shear stress/flow; Biofilm studies; cell culture in biochips with adherent cells (HUVECs), stem cells, HepG2 cells.

Fig. 477: Kima pump, controlled by iPod Touch

12.4.3 Mirus Evo Nanopump with PC control via VenaFlux Assay software

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: 100 nl/min – 10 ml/min ±1% (syringes available: 50 µl – 5 ml).
- Dead volume: ~ 600 µl
- Flow direction reversible
- PC controlled via VenaFlux Assay software.

Applications:

Microfluidic applications; Single Cell analysis; Microfluidic syringe pump for cell analysis under shear flow in biochips. Suitable for cell samples and whole blood samples.

Fig. 478: Mirus Evo Nanopump with MultiFlow8; controlled by PC software, VenaFluxAssay (included)

Product Code	Description	Price [€/instrument]
11-0855-0000-00	EXIGO-PUMP-2.0, 1x pump; 1x iPad mini with ExiGo App; 1 x tubing kit; power supply and cables; 1x sensor for active feedback	3,859.00
11-0879-0000-00	EXIGO-PUMP-2.2, 1x pump; 1x tubing kit; power supply and cables; 1x sensor for active feedback; 1 x manifold	4,174.00
11-0857-0000-00	EXIGO-PUMP-1.0, 1x pump; 1x iPad mini with ExiGo App; 1x tubing kit; power supply and cables	3,231.00
11-0858-0000-00	EXIGO-PUMP-1.1, 1x pump; 1x tubing kit; power supply and cables	2,621.00
11-0859-0000-00	KIMA-PUMP-1.0, 1x pump; 1x iPod Touch with Kima App; 1x iPod Dock; 1x tubing kit; 1x 100 mL bottle with GL45 cap; power supply and cables; Velcro strips to secure iPod Dock to CO_2 incubator	2,695.00
11-0860-0000-00	KIMA-PUMP-1.1, 1x pump; 1x tubing kit; 1x 100 mL bottle with GL45 cap; power supply and cables	1,195.00
11-0861-0000-00	MIRUS-PUMP-EVO, 1x syringe pump; 1x MultiFlow8; 1x VenaFluxAssay Software; 1 x tubing kit; power supply and cables	9,595.00

12.5 FLUIGENT – Ultraprecise fluid control systems

FLUIGENT develops, manufactures, and commercializes innovative fluid handling solutions for a variety of rapidly growing applications where fluid control matters. All our products can benefit from our ISO-9001 certified processes since 2010.

For more in depth information of FLUIGENT's flow-control technology, please review the following publications:

- Ryckelynck M, Baudrey S, Rick C, Marin A, Coldren F, Westhof E, Griffiths A; Using droplet-based microfluidics to improve the catalytic properties of RNA under multiple-turnover conditions, RNA, 2015, 21(3), 458-469.
- Hudson S, Sarangapani P, Pathak J, Migler K; A microfluidic capillary rheometer for characterization of protein solutions, J Pharm Sci, 2015, 104(2), 678-685.
- Kardash E, Reichman-Fried M, Maître JL, Boldajipour B, Papusheva E, Messerschmidt EM, Heisenberg CP, Raz E: A role for Rho GTPases and cell-cell adhesion in single-cell motility in vivo, Nat Cell Biol. 2010, 12(1), 47-53.

12.5.1 Flow EZ™ most advanced flow controller

Main characteristics of the Flow EZ™ flow controller:
- Easy to use: just dial in set pressure
- Best performance available
- No PC required
- Expandable by the user
- Engineered for microfluidics' lab bench

The benefits of Fluigent's new patent-pending technology for our Flow EZ™ microfluidic pump are the local control with the intuitive dial, the live control and monitoring with the integrated OLED screen, the expandable design, the easy connection to our flow sensors and the low gas consumption.

Fig. 479: Fluigent's Flow EZ™ flow controller

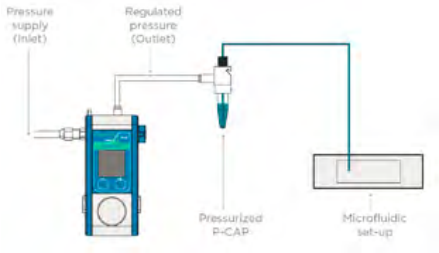


Fig. 480: Schematic set-up of Fluigent's Flow EZ™ flow controller

Pressure ranges	0-25mbar	0-69mbar	0-345mbar	0-800mbar	0-1000mbar	0-2000mbar	0-7000mbar
Type of pressure available	Negative or positive	Negative or positive	Negative or positive	Negative	positive	positive	positive
Pressurizing gas	Non-corrosive or explosive gas (pressurized air recommended, or N_2, Ar, CO_2)						
Size	12.5 x 5.5 x 7.5 cm^3 (4.7 x 2 x 2.75 $inch^3$)						
Weight	625 g (1.4 lbs)						

Possibility to connect up to 16 Flow EZ™ modules on the same set-up.
Example of applications:
- Droplet generation and manipulation
- Organ on chip
- Beads manipulation
- Kinetics measurements
- Biological applications (blood / cells)
- Microfluidic flow control

Product reference	Product Name	Price [€]
11-0890-0000-00	Flow EZ™ module	1,948.00

12.5.2 MFCS™-EZ pressure-based flow controller

The benefit of FLUIGENT's patented FASTAB™ technology are fast equilibrium times, superior reproducibility and a pulsation-free liquid operation even in the nanoliter scale. These technical features are ensured through the pressure-driven approach including an advanced feedback loop with no mechanical parts involved.

Main characteristics of the MFCS™-EZ pressure-based flow controller:

- Easy to install and use
- Easy to automate
- Fast and stable
- Field proven technology
- Possibility to connect up to 4 MFCS™-EZ units (up to 16 independent channels) on the same set-up

The respective flow controller and the set-up of the overall system and connection to the microfluidic device are highlighted in the figures below.

Fig. 481: Fluigent's MFCS™-EZ pressure-based flow controller

Fig. 482: OEM version of Fluigent's MFCS™-EZ pressure-based flow controller for pre-industrial or industrial applications

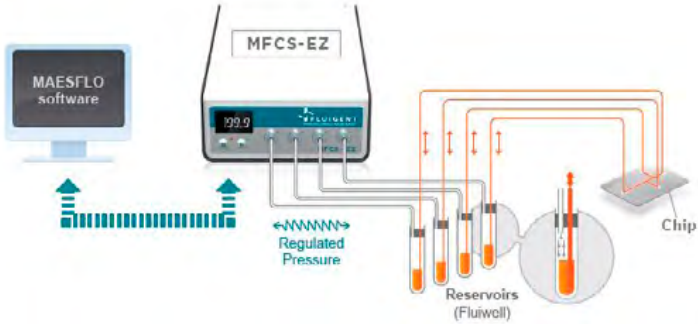


Fig. 483: Schematic set-up of Fluigent's MFCS™-EZ pressure-based flow controller with fluid reservoir and connection to the microfluidic device

Pressure ranges	0 – 25 mbar	0 – 69 mbar	0 – 345 mbar	0 – 800 mbar	0 – 1000 mbar	0 – 7000 mbar
Type of pressure available	Negative & positive	Negative & positive	Negative & positive	Negative	Positive	Positive
Pressure sensor resolution	0.03% F.S. 7.5 µbar	0.03% F.S. 20.7 µbar	0.03% F.S. 105 µbar	0.037% F.S. 300 µbar	0.03% F.S. 300 µbar	0.03% F.S. 2.1 mbar
Response time	Down to 40 ms depending on user PC operating system and configuration					
Settling time	Down to 100 ms (output volume dependent)					
Pressurizing gas	Non corrosive or explosive gas (pressurized air recommended, or N_2, Ar, CO_2)					
Size	16 x 23 x 6.5 cm^3 (6.3 x 9 x 2.5 $inch^3$)					
Weight	2.0 kg (4.4 lbs)					
Output connectors	Female Luer Lok					4 mm OD tube connectors

Product Code	Description	Price [€]*
11-0868-0000-00	Fluigent MFCSTM-EZ 1 channel	2,340.00
11-0869-0000-00	Fluigent MFCSTM-EZ 2 channels	4,280.00
11-0870-0000-00	Fluigent MFCSTM-EZ 3 channels	6,220.00
11-0871-0000-00	Fluigent MFCSTM-EZ 4 channels	8,160.00
11-0879-0000-00	Fluigent MFCS-EX 8 channels	12,990.00

*: including MAESFLO™ software

12.5.3 ESS™ fluid handling Platform

The ESS™ is a unique fluid handling platform enabling automated selections and injections of fluids thanks to three powerful accessories:

- 2-Switch™ valve
- M-Switch™ 10-way bidirectional valve
- Switchboard

The elements of the fluid handling platform

2-Switch™ valve

2-SWITCH™
2-way bidirectional valve

A bidirectional 3-port / 2-way valve, controlled by the ESS™ software or manually as a stand alone device

- Fast response time: 20 ms
- Chemical and biological compatibility (wetted materials: teflon)
- Low internal volume (12 µL)
- No heating
- Use as a stand alone and manual system or software controlled (full automation)
- Possibility to connect up to 8 2-SWITCH™ on the same SWITCHBOARD
- No dead volume
- Easy identification of the positions thanks to indicator lights

M-Switch™ 10-way bidirectional valve

M-SWITCH™
10-way bidirectional valve

A bidirectional 11-port / 10-way valve injecting and selecting up to 10 different liquids controlled by the ESS™ software

- Chemical & biological compatibility (RPC-7)
- Low internal volume (11.6 µL)
- Integrated fittings
- Software controlled – Full automation
- Possibility to connect up to 4 M-SWITCH TM on the same SWITCHBOARD
- No dead volume

SWITCHBOARD Communication hub

SWITCHBOARD
Communication platform

A platform managing the communication and the control of up to 4 M-SWITCH™ and 8 2-SWITCH™

- Centralized communications to the computer
- Computer connection with a single USB plug
- Provided power supply for M-SWITCH™ and 2-SWITCH™

Operation options of the fluid handling platform

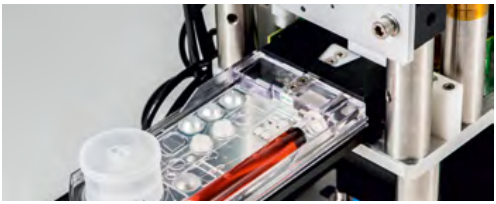
Applications

Up to 10 different reagents are selected and injected inside an on-chip reactor. The reagents are motioned and controlled by Fluigent (MFCS™-EZ + Flow Rate Platform) flow control devices, and injected into the chip when they are selected by the M-SWITCH™. All steps can be automated by the ESS™ Control software.

- Cell analysis
- Cell lysis and DNA extraction
- PCR analysis
- Calibration curve

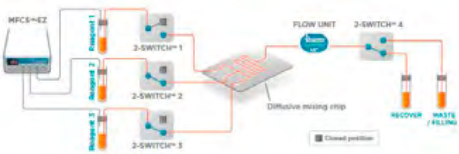
The sample is "loaded" into the sample loop connected to the L-SWITCH™ while the carrier buffer is injected directly into the chip. When the L-SWITCH™ is switched, the controlled volume included in the sample loop is "injected" into the chip with the carrier buffer. All steps can be automated by the ESS™ Control software. This kind of fluidic diagram can be very useful for cell culture.

- Cell culture
- Digital PCR
- Chromatography



Reagents #2 and #3 are injected while Reagent #1 path is closed. At the downstream of the chip, a 2-SWITCH™ is used as a 2-way switch to easily sort the exiting flow and send the sample that you want to recover into a special reservoir, while the remaining fluid goes to the waste. All the 2-SWITCH™ can be automated so that the selection of reagents and the outlet sorting are fully synchronized.

- Chemical mixing reactions
- Stoichiometry study



L-SWITCH™ Presentation

L-SWITCH™
6-port / 2-position bidirectional valve
A bidirectional 6-port / 2-position valve for injecting or switching different fluids controlled by the ESS™ software

- Chemical and biological compatibility (PEEK)
- Low port-to-port volume (660nL)
- External fittings
- Software controlled – Full automation
- Possibility to connect up to 4 L-SWITCH™ on the same SWITCHBOARD
- No dead volume

Product Code	Description	Price [€]
11-0872-0000-00	Fluigent 2-SWITCH™	970.00
11-0873-0000-00	Fluigent M-SWITCH™	3,010.00
11-0881-0000-00	Fluigent L-SWITCH™	2,395.00
11-0874-0000-00	Fluigent Switchboard™	510.00

12.5.4 FRP Flow-Rate Platform

The FRP Flow-Rate Platform enables to easily monitor* and control** the flow-rates in most microfluidic systems with superior precision and stability.

*: available in stand-alone version for flow monitoring (can be installed on set-ups having no MFCS™ pressure controller)

**: requires the Flow-Rate Control Module with a dongle in MAESFLO™ Software

Examples of applications:

- Droplet generation and manipulation
- Organ on chip
- Beads manipulation
- Kinetic measurements
- Biological applications (blood / cells)
- Microfluidic flow control

The elements of the FRP flow-rate platform

FLOW UNIT: high-precision bidirectional flow sensor

FLOW UNIT:
high-precision bidirectional flow sensor

5 models with different ranges for water, among which 3 models (S, M and L) with a dual calibration: water and hydrocarbon based liquids (comparable with oil, solvents, fuel, alcohol)

FLOWBOARD: communication hub

FLOWBOARD:
communication hub

A hub managing the communication between MAESFLO™ software and up to 8 FLOW UNITS of any ranges and calibrations. Computer connection and power supply with a single USB plug

Performance characteristics of the different flow units FLOW UNIT	XS	S	M	L	XL
Calibrated media	Water	Water Isopropyl alcohol	Water Isopropyl alcohol	Water Isopropyl alcohol	Water
Range	0 -±1.5 µl/min	0-±7 µl/min 0-±70 µl/min	0-±80 µl/min 0-±500 µl/min	0-±1 ml/min 0-±10 ml/min	0-±5 ml/min
Accuracy	10% m.v. between -1500 to -75 and 75 to 1500 nl/min	5% m.v. between -7 to -0.35 and 0.35 to 7 µl/min 20% m.v. between -70 to -1 and 1 to 70 µl/min	5% m.v. between -80 to -2.4 and 2.4 to 80 µl/min 20% m.v. between -500 to -25 and 25 to 500 µl/min	5% m.v. between -1 to -0.03 and 0.03 to 1 ml/min 20% m.v. between -10 to -0.5 and 0.5 to 10 ml/min	5% m.v. between -5 to -0.2 and 0.2 to 5 ml/min
	7.5 nl/min between -75 to 75 nl/min	17.5 nl/min between -0.35 to 0.35 µl/min	500 nl/min between -2.4 to 2.4 µl/min	1.5 µl/min between -30 to 30 ml/min	10 µl/min between -200 to 200 µl/min
Sensor inner diameter	25 µm	150 µm	480 µm	1.0 mm	1.8 mm
Wetted materials	PEEK and Quartz	PEEK and Quartz	PEEK and boro-silicate glass	PEEK and boro-silicate glass	PEEK and boro-silicate glass

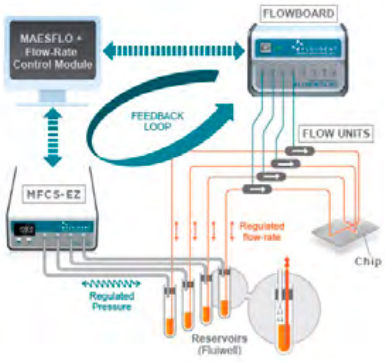


Fig. 484: Schematic set-up of flow-rate control or volume control using the FRP platform while keeping all the benefits of pressure actuation by MFCS™.

Product Code	Description	Price [€]
11-0875-0000-00	Fluigent flow unit	1,530.00
11-0876-0000-00	Fluigent flowboard	510.00
11-0877-0000-00	Fluigent flow-rate control module (regulation algorithm)	970.00

12.6 Laboratory Syringe Pump LSP ONE from Advanced Microfluidics

Thanks to its zero dead volume valve, the LSP ONE pump is more accurate, easier to clean, and reduces cross-contamination between liquids compared to competing laboratory pumps.

Our dilutor can replace a complex system with multiple pumps, valves, sampling loops and cumbersome cleaning systems, thus drastically simplifying your microfluidic automation. With only one dilutor, you will obtain a high flexibility and degree of automation.

Compact, robust and self-cleaning fluidic automation is now achievable.

TECHNICAL SPECIFICATIONS

- Dead volume: < 1 µl
- Plunger travel: 30 mm with 96'000 steps for nearly pulseless flow
- Plunger drive: Screw drive with linear encoder for step loss detection
- Syringe sizes: 500 µl (25 µl, 50 µl, 100 µl, 250 µl, 1.0 ml – also available upon request)
- Valves configuration: Zero dead-volume multiport distribution with absolute angular encoder
- Valve materials: PCTFE, PTFE
- Plunger material: PE or PTFE
- Tubing port fittings: Standard 1/4-28 UNF
- Accuracy: ≤ 1 % deviation from expected value at full stroke
- Interfaces: USB, RS-232, RS-485
- Dimensions: 245 mm x 143 mm x 85 mm
- Power: 19 VDC, 1.5 A peak

Fig. 485: LSP ONE Laboratory Syringe Pump

Product Code	Description	Price [€/instrument]
11-0878-0000-00	LSP ONE Laboratory Syringe Pump Including: 6-ports rotary valve, 500 µl syringe	starting at 3,227.00 - configuration dependent

12.7 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. As they are almost completely made of plastics, large quantities of these pumps can be produced at low cost and may well be used as disposables. These piezo-driven membrane pumps are available in starter kits to quickly enable the user to familiarize themselves with the technology. The kits contain three mp6 micropumps, a controller/controller board and suitable tubing.

Fig. 486: mp6-go! set for pump evaluation

Fig. 487: mp6 basic set for pump evaluation

Product Code	Description	Price [€/instrument]
11-0880-0000-00	mp6-hyb-go! set, consisting of 3 mp6-hyb; 1 mp-x; 1 mp-t 1,3 mm; 1 mp6-con; 1 USB-cable; 1 power supply and 10 mp-hc	629.35
11-0881-0000-00	mp6-hyb-basic set, consisting of 3 mp6-hyb; 1 mp6-EVA; 1 mp-t 1,3 mm und 10 mp-hc	249.00
11-0882-0000-00	mp6-hyb-pro set, consisting of 5 mp6-hyb; 5 mp6-OEM; 5 mp6-mol; 1 mp-t 1,3 mm und 10 mp-hc	349.00
11-0883-0000-00	mp6-hyb-QuadEVA set, consisting of 4 mp6-hyb; 1 mp6-QuadEVA; 1 mp-t 1,3 mm; 1 mini-USB-cable; 1 power supply and 10 mp-hc	339.00
11-0884-0000-00	mp6-hyb-QuadOEM set, consisting of 4 mp6-hyb; 1 mp6-QuadOEM; 4 mp6-mol; 1 mp-t 1,3 mm and 10 mp-hc	229.00
11-0885-0000-00	mp6-hyb-QuadKEY set, consisting of 4 mp6-hyb; 1 mp6-QuadKEY; 1 mp-t 1,3 mm; 1 mini-USB-cable and 10 mp-hc	329.00

12.8 Pumps and Pressure Controllers by CorSolutions

12.8.1 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. 488: CorSolutions PeriWave – the pulseless peristaltic pump

12.8.2 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. 489: CorSolutions PneuWave pump with integrated flow and pressure sensors

12.8.3 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. 490: PneuWave ECO Pump (left) and flow meter (right)

12.8.4 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. 491: 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. 492: Flow meter

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.

Fig. 493: 2-, 4-, 6-fold flow meter and sensor unit

12.8.5 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.

12.8.6 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.

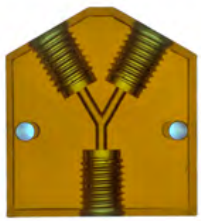


Fig. 494: CorSolutions microfluidic connectors – example of Y-1/4 28-1.0 design

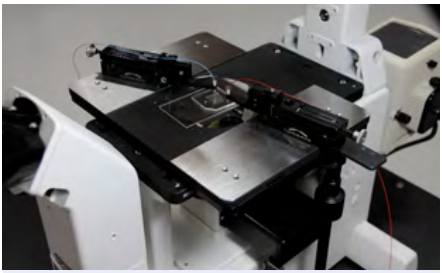


Fig. 495: Magnetic fluid scope

Product Code	Description	Detail	Price [€/instrument]
11-1154-0000-00	Pump	CorSolutions PneuWave pump with integrated flow and pressure sensors	Please contact for pricing
11-1155-0000-00	Pump	CorSolutions PneuWave ECO Pump	Please contact for pricing
11-1153-0000-00	Pump	CorSolutions PeriWave Pump	Please contact for pricing
11-1156-0000-00	Flow meter	CorSolutions Flow meter – Standard	Please contact for pricing
11-1157-0000-00	Flow meter	CorSolutions Flow meter – ECO	1,500.00
11-1158-0000-00	Flow meter	CorSolutions Flow meter – Multi with 2, 4 or 6-channels	Please contact for pricing

Product Code	Part Number	Architectures	Port Styles	Inner diameter	Price [€/piece]
11-1159-0000-00	U-1/4-28-1.0	Union	¼-28 Flat Bottom	1.0 mm	Please contact for pricing
11-1160-0000-00	U-1/4-28-1.6	Union	¼-28 Flat Bottom	1.6 mm	Please contact for pricing
11-1161-0000-00	Y-1/4-28-1.0	"Y"	¼-28 Flat Bottom	1.0 mm	Please contact for pricing
11-1162-0000-00	Y-1/4-28-1.6	"Y"	¼-28 Flat Bottom	1.6 mm	Please contact for pricing
11-1163-0000-00	T-1/4-28-1.0	"Tee"	¼-28 Flat Bottom	1.0 mm	Please contact for pricing
11-1164-0000-00	T-1/4-28-1.6	"Tee"	¼-28 Flat Bottom	1.6 mm	Please contact for pricing
11-1165-0000-00	X-1/4-28-1.0	Cross	¼-28 Flat Bottom	1.0 mm	Please contact for pricing
11-1166-0000-00	X-1/4-28-1.6	Cross	¼-28 Flat Bottom	1.6 mm	Please contact for pricing

12.9 Valving – memetis application-specific actuation in small dimensions

Modern microfluidic applications require performant miniature valves fitting into an ever-smaller installation space. Here, conventional technologies are increasingly reaching their limits. Based on latest shape memory actuation, highly compact miniature valves from *memetis* are characterized by strongly reduced dimensions, without compromising the performance. Fatigue-free state-of-the-art shape memory alloys (SMA) allow for silent and reliable operation over millions of cycles.

Currently, *memetis* offers two versions of 2/2 way miniature stop valves: a normally open and a normally closed version. A specifically designed control system ensures smooth and secure operation of the valves.

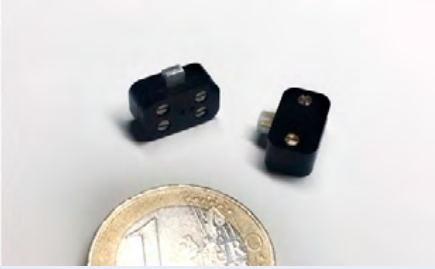


Fig. 496: *memetis* miniatur valves

Fig. 497: *memetis* NC valve

Fig. 498: *memetis* NO valve

Product Code	Description	Detail	Price [€/instrument]
32-7800-0000-00	*memetis* electrical control	Contains: - electrical control for up to 4 valves - supply voltage = 5V - USB-interface (on request); - Logic-Inputs	150.00
32-7801-0000-00	*memetis* SMA miniature valve (NO – normally open)	Nominal width: 0.75 mm Pressure range: max. 4 bar Housing material: PMMA (further materials upon request) Sealing material: EPDM (further materials upon request) Fluid temperature: 10 – 40 °C Ambient temperature: 0 – 40 °C Lifespan: 1,000,000 cycles Internal volume: 1.1 µl Fluid connection: Flange Electrical connection: Soldering pads Operating voltage: <5V, control Switching time – closing: 10 ms Switching time – opening: 100 ms Switching frequency: max. 5 Hz	300.00
32-7802-0000-00	*memetis* SMA miniature valve (NC – normally closed)	Nominal width: 0.75 mm Pressure range: max. 4 bar Housing material: PMMA (further materials upon request) Sealing material: EPDM (further materials upon request) Fluid temperature: 10 – 40 °C Ambient temperature: 0 – 40 °C Lifespan: 1,000,000 cycles Internal volume: 1.1 µl Fluid connection: Flange Electrical connection: Soldering pads Operating voltage: <5V, control Switching time – closing: 100 ms Switching time – opening: 10 ms Switching frequency: max. 5 Hz	350.00

Disclaimer: dimensions and technical properties of the valves may be varied without notice. Please contact *memetis* for details and for special requests on wetted materials.

Not (yet) for sales in USA/CAN.

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. 499: Microfluidic support kit 2

Fig. 500: Microfluidic support kit 3

Product Code	Kit Type	Product Description		Price [€/kit]
11-0800-0000-00	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 (3) - Single-use syringes (10 ml, 3) - Syringe adapter (3)	29-0611-0000-08 29-0803-0000-16 11-0801-0000-00 11-0804-0000-00 11-0805-0000-00	27.80
11-0812-0000-00	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)	29-0611-0000-08 29-0610-0000-08 29-0803-0000-16 11-0801-0000-00 11-0804-0000-00 11-0805-0000-00 09-0540-0331-09 09-0542-0331-09 09-0562-0331-11 09-0552-0334-09 09-0559-0334-11	96.50
11-0813-0000-00	Microfluidic support kit 3	- Microfluidic support kit 2 plus: - Female Luer Lok compatible connectors with wide base, material: PMMA (10) - Male Luer plugs, opaque, material: PP (10)	11-0812-0000-00 09-0512-0303-01 09-0503-0270-09	46.20
11-0850-0000-00	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 - mcs-foil 007 (3 sheets, 8 x 13,5 cm)	29-0611-0000-08 29-0803-0000-16 11-0801-0000-00 20-5004-0000-00 10-0692-0000-00	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. 501: Microfluidic starter kit 1

Fig. 502: Microfluidic starter kit 2

Fig. 503: Microfluidic starter kit 3

Fig. 504: Microfluidic starter kit 4

Product Code	Kit Type	Product Description		Price [€/kit]
11-0811-0000-00	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)	11-0800-0000-00 15-4000-0000-12 09-0540-0331-09 01-0173-0156-02 01-0170-0144-01 01-0179-0152-02 04-0130-0164-02 13-1004-0163-03 08-0471-0065-03 08-0470-0047-03 12-0904-0172-05	369.00
11-0814-0000-00	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)	11-0812-0000-00 01-0172-0156-01 01-0173-0156-02 01-0176-0142-01 01-0177-0142-02 12-0904-0172-05	432.00

Product Code	Kit Type	Product Description		Price [€/kit]
11-0824-0000-00	Microfluidic starter kit 3	- Microfluidic starter kit 1 - Bartels Micropump mp6-go! set	11-0811-0000-00 11-0880-0000-00	818.40
11-0825-0000-00	Microfluidic starter kit 4	- Microfluidic starter kit 2 - Bartels Micropump mp6-go! set	11-0814-0000-00 11-0880-0000-00	881.45

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. 505: Microfluidic interface kit 1 – Mini Luer plugs and connectors

Fig. 506: Microfluidic interface kit 2 – Luer plugs and connectors

Product Code	Kit Type	Product Description		Price [€/kit]
11-0819-0000-00	Microfluidic interface kit 1	- 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)	09-0541-0331-09 09-0542-0331-09 09-0562-0331-11 09-0551-0334-09 09-0559-0334-11	110.50
11-0820-0000-00	Microfluidic interface kit 2	Microfluidic interface kit 2: - 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)	 09-0508-0263-09 09-0509-0263-09 09-0503-0270-09 09-0504-0270-09	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. 507: Integrated chip support kit 1

Fig. 508: Integrated chip support kit 2

Product Code	Kit Type	Product Description		Price [€/kit]
11-0821-0000-00	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)	09-0541-0331-09 09-0562-0331-11 09-0551-0334-09 09-0559-0334-11 09-0509-0263-09 09-0504-0270-09 09-0565-0391-09 29-0611-0000-08 29-0803-0000-16 19-1852-0000-00 15-4000-0000-12	197.14
11-0822-0000-00	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)	09-0541-0331-09 09-0562-0331-11 09-0551-0334-09 09-0559-0334-11 09-0509-0263-09 09-0504-0270-09 09-0565-0391-09 29-0611-0000-08 29-0803-0000-16 15-4000-0000-12	169.76
11-0823-0000-00	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)	09-0541-0331-09 09-0562-0331-11 09-0551-0334-09 09-0559-0334-11 09-0565-0391-09 29-0611-0000-08 29-0803-0000-16 19-1852-0000-00 15-4000-0000-12	159.64

Product Code	Kit Type	Product Description		Price [€/kit]
11-0830-0000-00	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)	09-0541-0331-09 09-0562-0331-11 09-0551-0334-09 09-0559-0334-11 09-0565-0391-09 29-0611-0000-08 29-0803-0000-16 19-1852-0000-00	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. 509: Sample preparation starter kit 1 – plasma generation

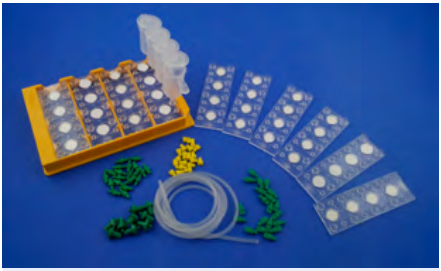


Fig. 510: Sample preparation starter kit 2 – enrichment

Product Code	Kit Type	Product Description		Price [€/kit]
11-0838-0000-00	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)	09-0567-0438-09 09-0565-0391-09 15-4000-0000-12 15-1504-0200-02 15-1507-0535-02	678.30

Product Code	Kit Type	Product Description		Price [€/kit]
11-0839-0000-00	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)	16-0605-0233-09 09-0552-0334-09 09-0565-0391-09 15-4000-0000-12 15-1505-0398-02 29-0611-0000-08 09-0541-0331-09 09-0509-0263-09	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.

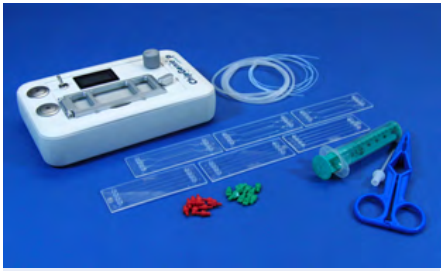


Fig. 511: *ChipGenie® edition P* starter kit 1

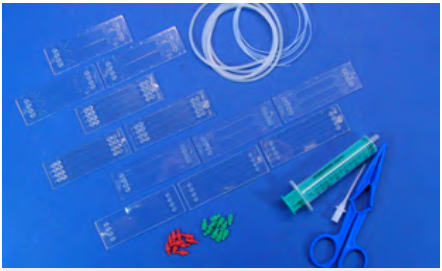


Fig. 512: *ChipGenie® edition P* starter kit 2

Fig. 513: *ChipGenie® edition P* starter kit 3 – DNA extraction from whole blood

Fig. 514: *ChipGenie® edition P* starter kit 5 – DNA extraction from bacterial suspension

Product Code	Kit Type	Product Description		Price [€/kit]
11-0810-0000-00	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)	08-0487-0000-00 11-0800-0000-00 09-0540-0331-09 09-0552-0334-09 12-0904-0172-05 01-0175-0138-02	759.00
11-0815-0000-00	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)	11-0800-0000-00 09-0540-0331-09 09-0552-0334-09 12-0904-0172-05 12-0911-0221-05 12-0917-0194-05 01-0175-0138-02	384.00
11-0816-0000-00	ChipGenie edition® 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	09-0541-0331-09 09-0552-0334-09 09-0565-0391-09 29-0611-0000-08 12-0904-0172-05 20-5050-0000-00	561.43
11-0818-0000-00	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	09-0541-0331-09 09-0552-0334-09 09-0565-0391-09 12-0904-0172-05 29-0611-0000-08 20-5051-0000-00	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.

DNA hybridization / microarray starter kit – custom specific spotting comprise 10 chips of two catalogue designs, which can be spotted with up to 10 custom specific molecules, including washing- and blocking solutions and accessories for a quick start on DNA hybridization or microarray analysis. Customer can chose between biotin labeled substrates for colorimetric or fluorescence readout.

DNA hybridization / microarray starter kit – spotting by customer comprise 10 chips of different unsealed chip designs, already glued with structured adhesive tape, which leaves the structures open, in order to enable spotting by customer. The kit includes accessories for the interconnection and optical clear sealing foils for the chip devices.

Fig. 515: PCR starter kit 1 - continuous flow PCR

Fig. 516: PCR starter kit 2 - oscillation PCR

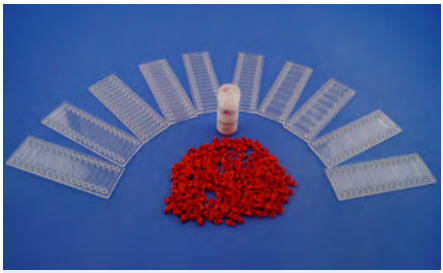


Fig. 517: PCR starter kit 3 - stationary PCR

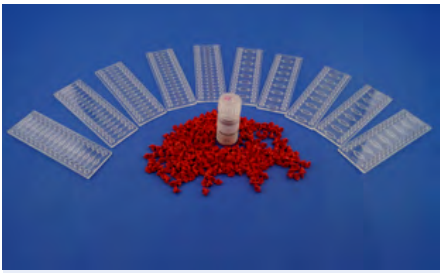


Fig. 518: PCR starter kit 4 - stationary qPCR

Fig. 519: DNA hybridization / microarray starter kit - custom specific spotting

Fig. 520: DNA hybridization / microarray starter kit - spotting by customer

Product Code	Kit Type	Product Description		Price [€/kit]
11-0843-0000-00	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 - mcs-foil 007 - mcs-on-chip PCR Master Mix 01, 10 reactions (0.25 ml) - 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	29-0611-0000-08 29-0803-0000-16 11-0801-0000-00 20-5004-0000-00 10-0692-0000-00 20-5052-0000-00 08-0470-0047-03 08-0471-0065-03 08-0479-0708-03 08-0473-0243-03 08-0474-0243-05	343.28
11-0831-0000-00	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) - mcs-on-chip PCR Master Mix 01, 10 reactions (0.25 ml) - Boyle-Mariotte PCR chip, material: PC (10) - Male Luer fluid connector, green, material: PP (10) - Manual	29-0611-0000-08 29-0803-0000-16 11-0801-0000-00 20-5052-0000-01 08-0469-0147-03 09-0509-0263-09	345.40
11-0832-0000-00	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) - mcs-on-chip PCR Master Mix 01, 120 reactions (2 ml) - Manual	09-0567-0438-09 12-0974-0561-05 12-0986-0558-05 12-0935-0133-05 12-0992-0559-05 12-1403-0556-05 20-5055-0000-00	299.18
11-0833-0000-00	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) - mcs-on-chip qPCR Master Mix 02, 120 reactions (1.6 ml) - Manual	09-0567-0438-09 12-0980-0585-05 12-0998-0584-05 20-5058-0000-00	427.84
11-0834-0000-00	DNA hybridization / microarray starter kit - customized spotting	- Mini Luer to pipette adapter, material: PP (20) - Male Luer plugs, opaque, material: PP (20) - Male Mini Luer plugs - Low volume displacement, red, material: PP (40) - Handling frame with high skirt, yellow (1) - Up to 10 molecules customized spotting on 10 catalogue chips - Straight channel chip, 1 channel, material: Zeonor (5) - Straight channel chip with waste chamber, 2 channels, material: Topas (5) - Buffer set with washing and blocking solutions for 15 reactions of: a. Biotin-labeled colorimetric readout, TMB b. biotin labeled fluorescence readout, Cy5/Fam - Manual	09-0565-0391-09 09-0503-0270-09 09-0567-0438-09 15-4000-0000-12 01-0183-0268-05 01-0235-0272-02 20-5102-0000-00 20-5103-0000-00	502.95

Product Code	Kit Type	Product Description		Price [€/kit]
11-0835-0000-00	DNA hybridi-zation / mic-roarray starter kit - spotting by customer	- Mini Luer to pipette adapter, material: PP (20) - Handling frame with high skirt, yellow (1) - Optical foil, microscopy slide size, 10 piece - 4 channel chip with double-sided adhesive tape, material: Topas (4) - 1 channel chip with double-sided adhesive tape, material: Topas (3) - 2 channel chip with waste reservoir and double-sided adhesive tape, material: Topas (3) - Male Mini Luer plugs - Low volume displacement, red, material: PP (50) - Male Luer plugs, opaque, material: PP, opaque (20) - Manual	09-0565-0391-09 15-4000-0000-12 17-1601-0138-02 17-1606-0268-02 17-1608-0272-02 09-0567-0438-09 09-0503-0270-09	451,50

13.8 ChipGenie® edition E 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.

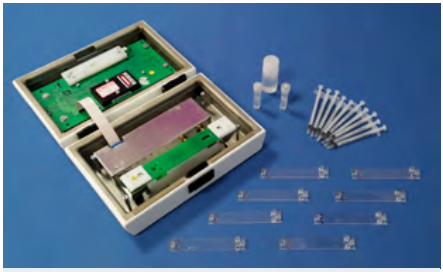


Fig. 521: ChipGenie® edition E – starter kit 1

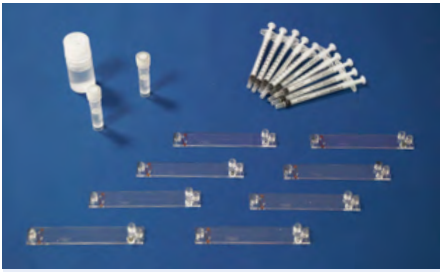


Fig. 522: ChipGenie® edition E – starter kit 2

Product Code	Kit Type	Product Description		Price [€/kit]
11-0827-0000-00	ChipGenie® edition E, starter kit 1	- ChipGenie® edition E 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: Anion standard solution, Li^+, Na^+, K^+ (1 ml) Cation standard solution, Cl^-, NO_3^-, SO_4^{2-} (1 ml) Organic acid standard solution, tartaric acid, succinic acid, citric acid (1 ml)	08-0486-0000-00 03-0110-0082-01 03-0111-0201-01 03-0798-0166-01 03-0799-0166-05 11-0809-0000-00 20-5061-0000-00 11-0829-0000-00	4,192.00

Product Code	Kit Type	Product Description		Price [€/kit]
11-0828-0000-00	ChipGenie® edition E, 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 E starter kit 3 – standards: Anion standard solution, Li^+, Na^+, K^+ (1 ml) Cation standard solution, Cl ; NO_3^-, SO_4^{2-} (1 ml) Organic acid standard solution, tartaric acid, succinic acid, citric acid (1 ml)	03-0110-0082-01 03-0111-0201-01 03-0798-0166-01 03-0799-0166-05 11-0809-0000-00 20-5061-0000-00 11-0829-0000-00	790.00
11-0829-0000-00	ChipGenie® edition E starter kit 3 - standards	- Cation standard solution (Li^+, Na^+, K^+) - Anion standard solution (Cl ; NO_3^-, SO_4^{2-}) - Organic acid standard solution (tartaric acid, succinic acid, citric acid)		78.20

13.9 Cell culture basic 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 included. The cell culture basic kits and the microfluidic accessories are designed for the combination with handling frames and chips of the cell culture product families.

Cell culture basic kit 1: Chips with hydrophilized surfaces, accessories and application notes for a quick start in adherent cell culture. The chips are suitable for applications like immunofluorescence microscopy, screening, apoptosis- and proliferation assays.

Cell culture basic kit 2: Chips with hydrophobic surfaces and microfluidic structures for retaining cells in the chip as well as accessories and application notes for a quick start in suspension cell culture.

Cell culture basic 3: Accessories, application notes and chips for various applications like sorting, mixing, filtration, chemotaxis and many more. The chips are usable for adherent cell culture as well as suspension cell culture.

Fig. 523: Cell culture basic kit 1

Fig. 524: Cell culture basic kit 2

Fig. 525: Cell culture basic kit 3

Product Code	Kit Type	Product Description		Price [€/kit]
11-0840-0000-00	Cell culture basic kit 1 – adherent cell culture	- Male Mini Luer fluid connector, green, material: PP (10) - Male Mini Luer fluid connector, 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) - Handling frame with high skirt, yellow (1) - Rhombic chamber chip, 100 µl chamber volume, material: Zeonor, hydrophilized (2) - Rhombic chamber chip, 250 µl chamber volume, material: Zeonor, hydrophilized (2) - Rhombic chamber chip, 6 µl chamber volume, material: Zeonor, hydrophilized (2) - Rhombic chamber chip, 20 µl chamber volume 20 µl, material: Zeonor, hydrophilized (2) - Straight channel chips in microtiter-plate format, 64 Channels, material: Zeonor, hydrophilized (1) - Rhombic chamber chip, 20 µl chamber volume 20 µl, material: Zeonor, hydrophilized (1) - Manual	09-0541-0331-09 09-0562-0331-11 09-0551-0334-09 09-0559-0334-11 09-0565-0391-09 29-0611-0000-08 29-0803-0000-16 15-4000-0000-12 12-0914-0221-05 12-0920-0194-05 12-0926-0132-05 12-0932-0131-05 01-0249-0102-05 12-0971-0478-05	501.72
11-0841-0000-00	Cell culture basic kit 2 – suspension cell culture	- Male Mini Luer fluid connector, green, material: PP (10) - Male Mini Luer fluid connector, 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) - Handling frame with high skirt, yellow (1) - Weir-filter chip, material: Zeonor (3) - Cross-flow membrane chip, material: Topas (3) - Rhombic chamber chip, 250 µl chamber volume, material: Zeonor (3) - Manual	09-0541-0331-09 09-0562-0331-11 09-0551-0334-09 09-0559-0334-11 09-0565-0391-09 29-0611-0000-08 29-0803-0000-16 15-4000-0000-12 14-1031-0220-05 15-1506-0480-02 12-0917-0194-05	449.24
11-0842-0000-00	Cell Culture basic kit 3 - Sorting, Filtration, Mixing	- Male Luer fluid connectors, green, material: PP (10) - Male Luer plugs, opaque, material: PP (10) - 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) - Handling frame with high skirt, yellow (1) - Cross-flow membrane chip, material: Topas (1) - Cross-flow membrane chip, material: Topas (1) - Weir-filter chip, material: Zeonor (1) - Spiral sorter chip, material: Zeonor (1) - Diffusion mixer, material: Zeonor (1) - Herringbone mixer, material:Zeonor (1) - Micro mixer with stir bar, material: Zeonor (1) - Pillar chip, material: Zeonor (1) - Manual	09-0509-0263-09 09-0504-0270-09 09-0541-0331-09 09-0562-0331-11 09-0551-0334-09 09-0559-0334-09 09-0565-0391-09 29-0611-0000-08 29-0803-0000-16 15-4000-0000-12 15-1506-0480-02 15-1505-0398-02 14-1031-0220-05 18-1709-0382-05 14-1036-0186-05 14-1038-0187-05 14-1040-0286-05 19-1801-0261-05	514.68

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*.

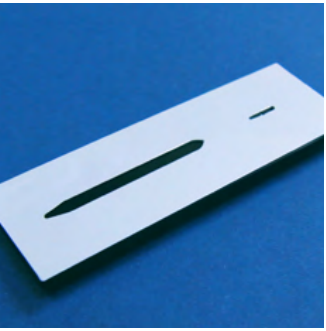
microfluidic ChipShop offers three different droplet generation kits for conducting the first step in this field.

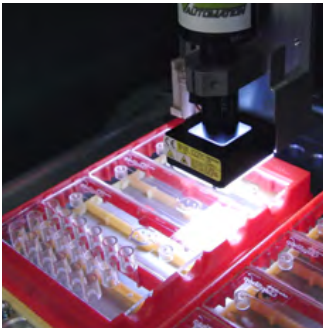
Fig. 526: Droplet generation kit - Mini Luer kit

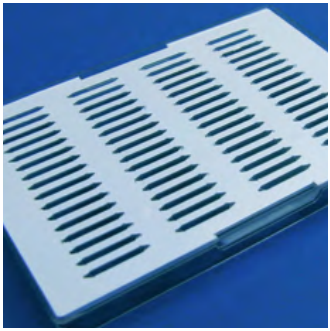
Fig. 527: Droplet generation kit - Luer kit

Fig. 528: Droplet generation kit - Glass kit

Product Code	Kit Type	Product Description		Price [€/kit]
11-0845-0000-00	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 - PTFE Tubing	13-1001-0162-02 13-1003-0163-02 13-1005-0285-02 25-2003-0832-09 15-4003-0000-12 09-0542-0331-09 09-0552-0334-09 29-0610-0000-08 29-0803-0000-16	277.50
11-0848-0000-00	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 - PTFE Tubing	13-1002-0162-03 13-1004-0163-03 13-1006-0285-03 25-2003-0832-09 15-4003-0000-12 09-0542-0331-09 09-0552-0334-09 29-0610-0000-08 29-0803-0000-16	277.50
11-0846-0000-00	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 - PTFE Tubing	13-1011-0536-02 13-1009-0537-02 25-2003-0832-09 15-4003-0000-12 09-0542-0331-09 09-0552-0334-09 29-0610-0000-08 29-0803-0000-16	248.50
11-0849-0000-00	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 - PTFE Tubing	13-1012-0536-03 13-1010-0537-03 25-2003-0832-09 15-4003-0000-12 09-0542-0331-09 09-0552-0334-09 29-0610-0000-08 29-0803-0000-16	248.50
11-0847-0000-00	Droplet generation kit - Glass kit	- Fluidic 441 - Droplet Generator Glass Chip (2) - Handling Platform LOC-HP/CC1 without Heating Element - Silicone - PTFE Tubing	13-1300-0441-20 22-4500-0000-00 29-0610-0000-08 29-0803-0000-16	1,372.90







14 Customize standard chips – Platforms for on-site assembly

Customize standard chips – Platforms for on-site assembly

With our Lab-on-a-Chip catalogue, a wide variety of off-the-shelf devices is at hand allowing for a customization at the user's side. On the one hand side this allows to combine different modules with each other in order to achieve certain fluidic functionalities via a series of chips, on the other hand this implies a modification of the chips themselves. This modification mainly refers to the integration of further functionalities or the integration of special surface functions. This chapter highlights the tools like microfluidic chips and spotter but it should help to generate new ideas to start a customization at the user's side with existing chip modules.

14.1 Customize your chips – spotting

The integration of protein- or DNA-arrays on a chip is one frequently requested option from research settings. Although a spotting service is offered from us, many research labs would like to evaluate special targets and functionalization methods and do their own spotting.

For these users, several chip types are at hand, having an integrated fluidic channel that remains open for the spotting 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 the spotting just the protective foil needs to be removed and either a thin foil of the same material or a glass slide can be mounted on top.

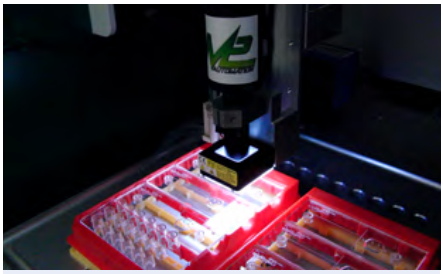


Fig. 529: M2-Automation instrumentTWO-200 in action

Fig. 530: instrument TWO-200spotting in microfluidic devices DNA-Arrey embedded in a microfluidic channel

M2-Automation offers an easy to use and robust micro-dispensing (spotting) solution. The spotter instrumentTWO-200 is recommended in order to start right away with your own spotting tasks.

Product Code	Description	Starting at Price per instrument [€]
11-0896-0000-00	instrumentTWO-200 spotter	40,000.00

As chip modules for self-assembling of the cover lid on spotted devices, several straight channel chips are available.

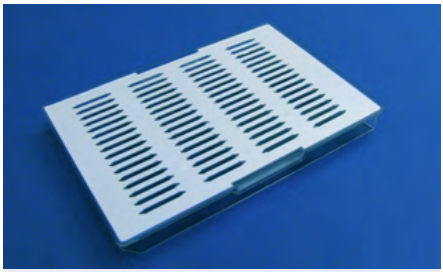


Fig. 531: Titer-plate sized microfluidic device for customization

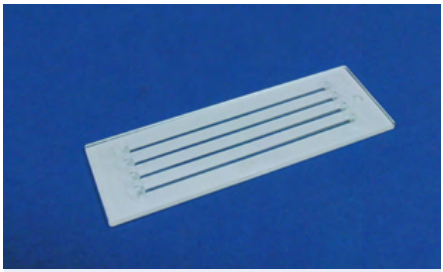


Fig. 532: Straight channel chip FI. 138 with double-sided adhesive tape

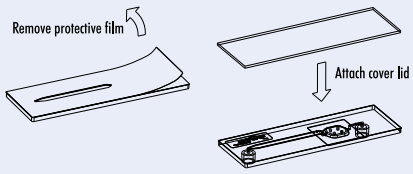


Fig. 533: Principle set-up of chip and double-sided adhesive tape

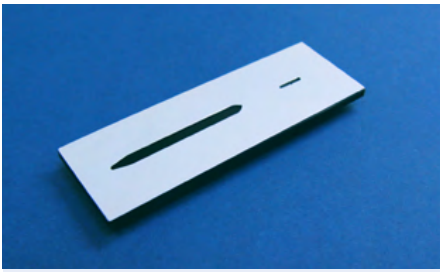


Fig. 534: Straight channel chip Fl. 95 with double-sided adhesive tape and waste reservoir

Product Code	Description	Channel Width [µm]	Channel Depth [µm]	Channel Length [mm]	Material	Price [€/chip] 1+	Price [€/chip] 10+
17-1600-0138-01	4 channel chip Fl. 138	1,000	340	58.5	PMMA	48.50	36.50
17-1601-0138-02	4 channel chip Fl. 138	1,000	340	58.5	Topas	48.50	36.50
17-1602-0095-01	1 channel chip Fl. 95	2,000	440	36	PMMA	52.50	36.60
17-1603-0095-02	1 channel chip Fl. 95	2,000	440	36	Topas	52.50	36.60
17-1604-0095-02.1	1 channel chip Fl. 95	2,000	440	36	Topas, black	52.50	36.60

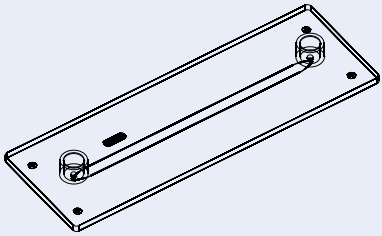


Fig. 535: Schematic drawing of the one channel chip with Luer interface 268 to be equipped with double-sided adhesive tape

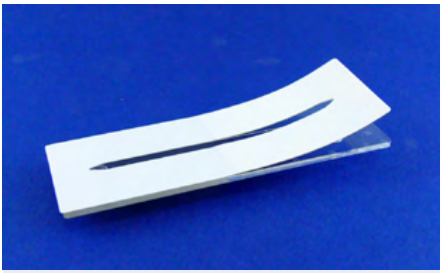


Fig. 536: Straight channel chip 268 with double-sided adhesive tape

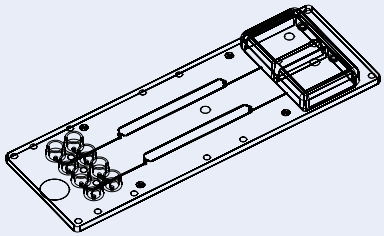


Fig. 537: Schematic drawing of a straight channel chip with waste chamber 272 to be equipped with double-sided adhesive tape

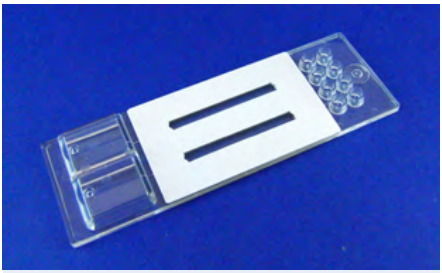


Fig. 538: Straight channel chip 272 with double-sided adhesive tape

Product Code	Description	Channel Width [µm]	Channel Depth [µm]	Channel Length [mm]	Material	Price [€/chip] 1+	Price [€/chip] 10+
17-1605-0268-01	1 channel chip Fl. 268	2,500	290	26	PMMA	48.50	36.50
17-1606-0268-02	1 channel chip Fl. 268	2,500	290	26	Topas	48.50	36.50
17-1607-0272-01	2 channel chip with waste reservoir Fl. 272	2,500	340	58.5	PMMA	52.50	36.60
17-1608-0272-02	2 channel chip with waste reservoir Fl. 272	2,500	340	58.5	Topas	52.50	36.60

In general, any catalog chip can be delivered without a bonded cover lid in order to connect the chip with a customer-specific bottom (e.g. glass slide). As somewhat generic design rules, the following aspects should be taken under consideration:

1. Minimum channel width to be cut into the double-sided adhesive tape: 200 µm
2. Minimum radius of curvature of structures cut in one line in the tape: 500 µm
3. Minimum distance between two adjacent cut-out structures: 1 mm
4. In general, 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.

14.2 Spotter Instrumentation

Based on long-term experiences, we recommend M2-Automation as partner for easy to use and robust micro-dispensing (spotting) solutions. In particular, we endorse the instrumentTWO-200 in order to start right away with your own spotting tasks.

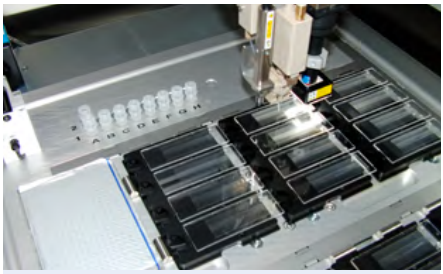


Fig. 539: M2-Automation instrumentTWO-200 in action

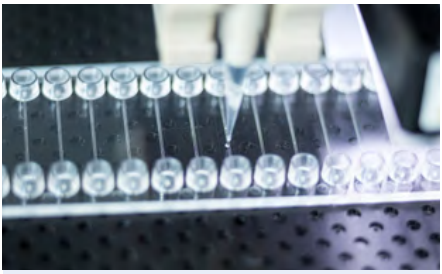


Fig. 540: instrumentTWO-200 spotting in microfluidic devices DNA-Array embedded in a microfluidic channel

M2-Automations novel Triple-Jet Technology combines in a single instrument three different micro-dispensers: the Piezo driven micro dispenser (PDMD, 20 pL+) for picolitre volume applications, the solenoid valve driven micro-dispenser (SDMD, 20 nL+) and the proprietary M2-microdispenser (M2MD, 10 nL+), both for nanoliter, microliter and low milliliter volume applications. By adjusting the dispensing parameters, the user can optimize droplet flight path, velocity and volume, ensuring accurate placement of features onto the substrate.

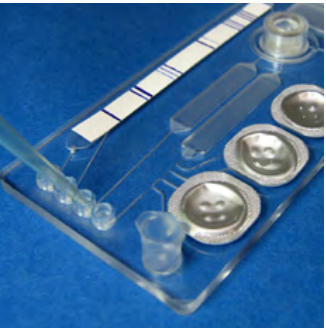
The spotter features an accurate (± 20µm XY precision) motion system together with a unique positioning system of the substrate trays. An overhead digital camera is used for target teaching and visualization, detection, alignment, documentation and quality control.

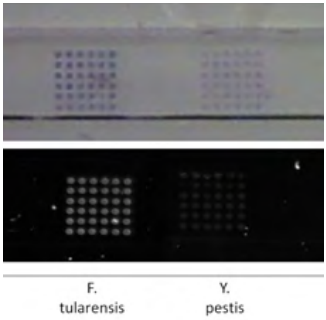
The instrumentTWO-200 is supplemented by a powerful software package, providing an intuitive interface flexible to meet specific individual needs, for the creation of customized procedures or personalized array layouts. While the creation of experiments is simple and suited for most customer demands it is incorporating a high level of flexibility, allowing the user maximum control.

Technical data:
- Capacity: 2MTP-sized positions
- Piezo driven micro-dispensing devices
- Volume range: 20 pL to 300 pL per single droplet
- CV of dispensed volumes: approx. 1%
- Volume range 10 nL to mL per single ejection
- Solenoid volume ranges 10+ nL, 30+ nL, 40+ nL, 10 - 50 nL, 20 - 200 nL
- Dispense modes: aspirate and dispense; resuspend samples; dispense out of large volume source vials
- Chemically inert and biologically compatible
- Maximum drive range: X = 200mm, Y = 200 mm, Z= 50 mm
- Single increment resolution: 10µm
- Positioning accuracy in XY directions +/–20 µm
- Maximum speed: X = 0.3 m/s, Y = 0.3 m/s, Z = 0.1 m/s

Fig. 541: instrumentTWO-200

Product Code	Description	Starting at Price per instrument [€]
11-0896-0000-00	instrumentTWO-200 spotter	40,000.00




F.
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15 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.

15 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.

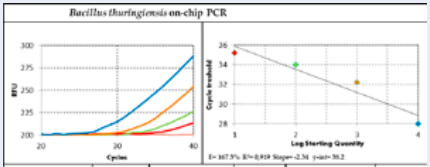
Independent how different the custom specific assays themselves are, the underlying principle and general steps to transfer the assay on chip have similar requirements and are part of microfluidic ChipShop's daily business.

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. 542: Implementation of low-volume real-time PCR on chip – Chip on breadboard instrument



initial DNA- conc.	on chip	initial DNA- conc.	on chip	initial DNA- conc.	on chip
10^6 GE/PCR	N/A	10^2 GE/PCR	34.00	10^4 GE/PCR	28.00
10^5 GE/PCR	35.20	10^3 GE/PCR	32.20	NTC	N/A

Fig. 543: Implementation of low-volume real-time PCR on chip – Real-time PCR curve of *Bacillus thuringensis* PCR

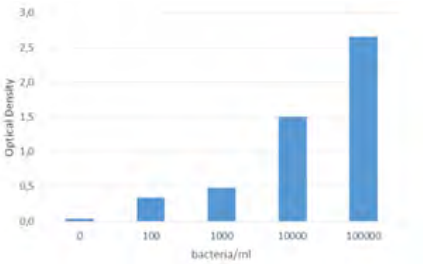


Fig. 544: Immunoassay on chip: results from colorimetric detection of *Francisella tularensis*

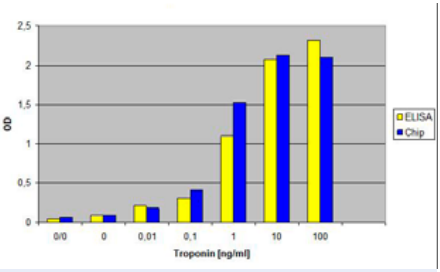
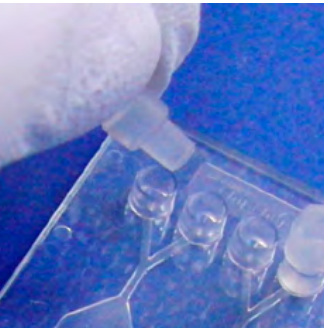
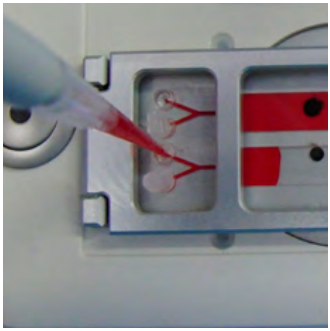


Fig. 545 Implementation of frit-based immunoassay on chip – Target: Troponin, comparison of standard ELISA plate versus assay on chip, colorimetric detection: poly HRP (pHRP)/TMB (blue dye)

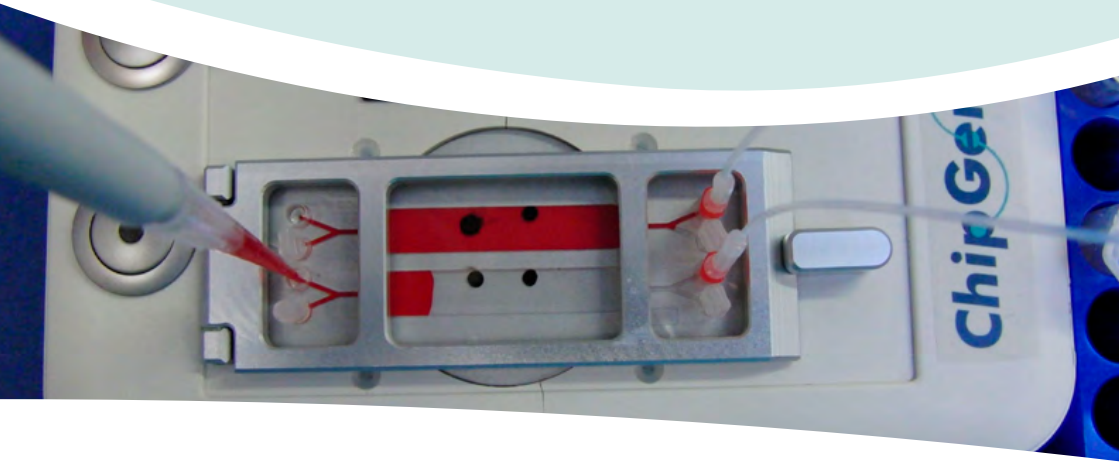
Fig. 546: Implementation of frit-based immunoassay on chip – Target: Troponin, colorimetric detection: poly HRP (pHRP)/TMB (blue dye)






55.0

16 Application notes



Application notes

Handling procedures, protocols, and exemplary applications: This chapter gives advice to run specific experiments with lab-on-a-chip systems.

16.1 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 Lok 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.

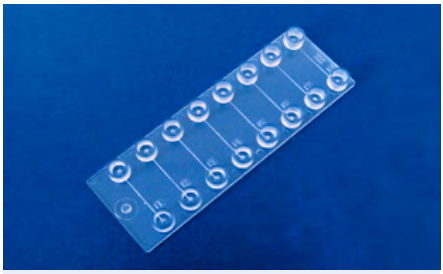


Fig. 547: Chip with female Luer fluidic interfaces

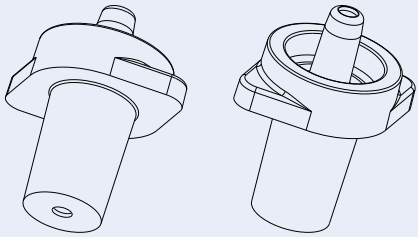


Fig. 548: Male Luer connector

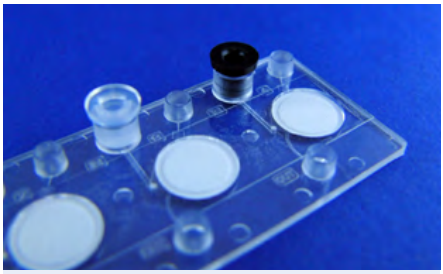


Fig. 549: Cap to close female Luer interfaces

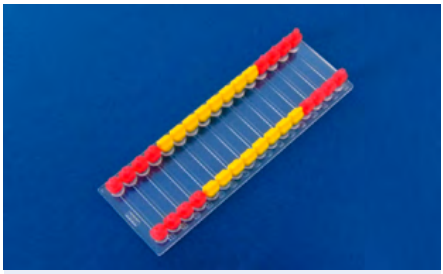


Fig. 550: Mini Luer connectors and plugs mounted on a Mini Luer fluidic platform

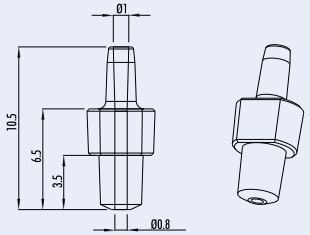


Fig. 551: Schematic drawing of a Mini Luer connector

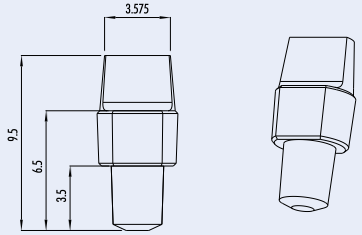


Fig. 552: Schematic drawing of a Mini Luer Plug

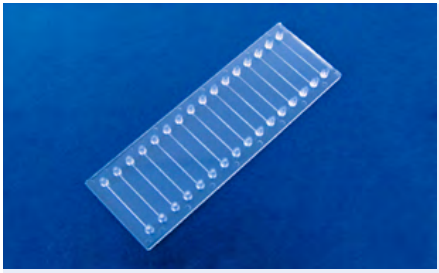


Fig. 553: Microfluidic platform with olives as fluidic interface

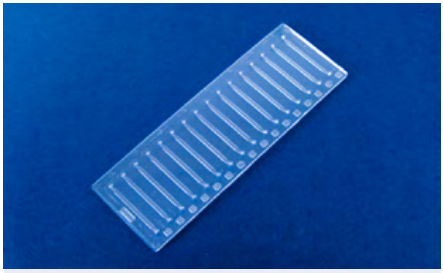


Fig. 554: Microfluidic platform with through holes as fluidic interface

16.1.1 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.

Required item:
1. Microfluidic chip with Mini Luer interface
2. Conventional pipette

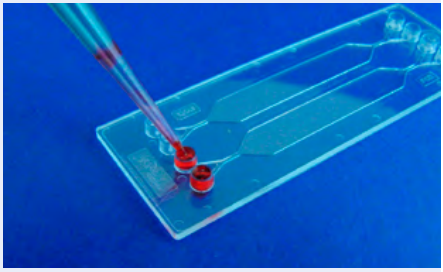


Fig. 555: Microfluidic chip with Mini Luer interfaces filled with a pipette and interfaces used as reservoir

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 (14-1039-0286-01)
2. Handling frame, e.g. orange (15-4001-0000-12)
3. Male Mini Luer fluid connectors, e.g. the green version (09-0541-0000-09)
4. Male Mini Luer plugs, e.g. the red version (09-0551-0000-09)
5. Silicone tube, e.g. ID: 0.5 mm (29-0611-0000-08)
6. PTFE tube, e.g. ID: 0.5 mm (29-0803-0000-16)
7. Peristaltic pump
8. Tube for peristaltic pump
9. Eppendorf vessel

Fig. 556: 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

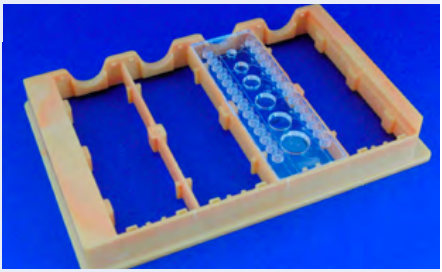


Fig. 557: Micromixer inserted in handling frame

Step 2: Mini Luer connector & silicone sleeve

2. Interface the Mini Luer fluid connector with a small piece of silicone tube

Fig. 558: 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

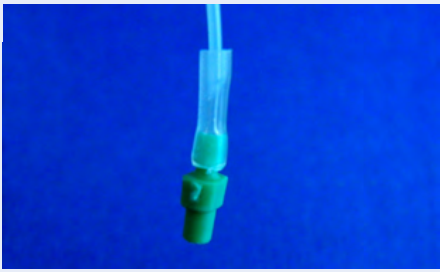


Fig. 559: Connection of Mini Luer fluid connector with mounted silicone sleeve with a PTFE tube

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

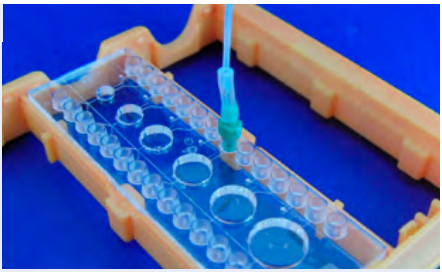


Fig. 560: Insertion of the Mini Luer with tubings in fluid entrance of the chip

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

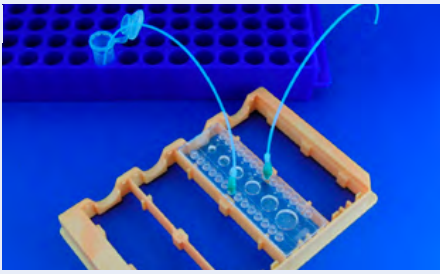


Fig. 561: Insertion of the Mini Luer with tubings in fluid exit of the chip and connection of tube with sampling vessel

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.

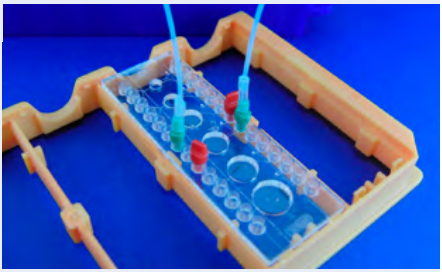


Fig. 562: Closed unused fluid ports on chip with red Mini Luer plugs

Step 7: Connect chip with pump

7. Connect the PTFE tube with the tube inserted in the pump

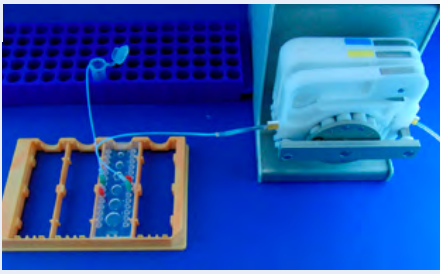


Fig. 563: Connection of the chip via the PTFE tube with the pump

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. 564: Connection of pump via a PTFE tube with a liquid reservoir

16.1.2 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

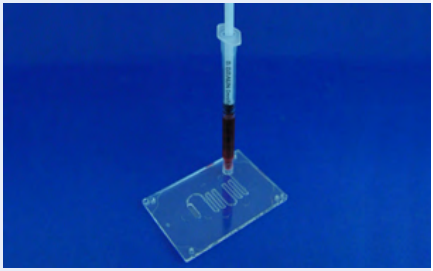


Fig. 565: Microfluidic chip with Luer interfaces filled with a standard syringe

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

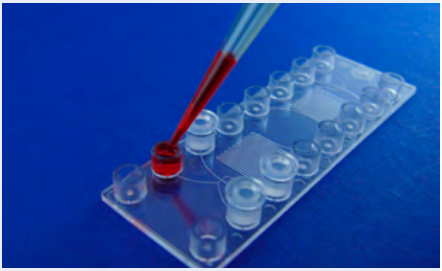


Fig. 566: Microfluidic chip with Luer interfaces filled with a pipette and interfaces used as reservoir

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 (14-1035-00186-01)
2. Handling frame, e.g. orange (15-4001-0000-12)
3. Male Luer fluid connectors, e.g. the green version (09-0509-0000-09)
4. Male Luer plugs, e.g. the black version (09-0504-0000-09)
5. Silicone tube, e.g. ID: 0.5 mm (29-0611-0000-08)
6. PTFE tube, e.g. ID: 0.5 mm (29-0803-0000-16)
7. Peristaltic pump
8. Tube for peristaltic pump
9. Eppendorf vessel

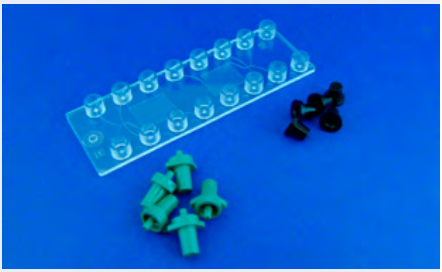


Fig. 567: Microfluidic chip with Luer interfaces with Luer fluid connectors and plugs

Step 1: Chip & handling frame

1. Insert the microfluidic chip in a handling frame for microfluidic chips in microscopy slide format

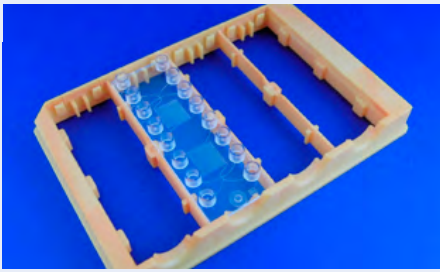


Fig. 568: Micromixer inserted in handling frame

Step 2: Luer connector & silicone sleeve

2. Interface the Luer fluid connector with a small piece of silicone tube

Fig. 569: 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. 570: Connection of Luer fluid connector with mounted silicone 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

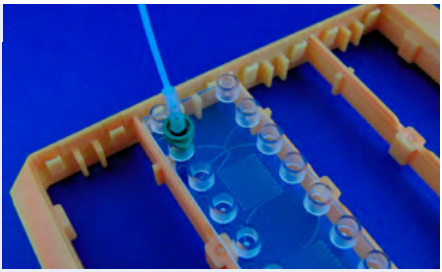


Fig. 571: Insertion of the Luer with tubings in fluid entrance of the chip

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

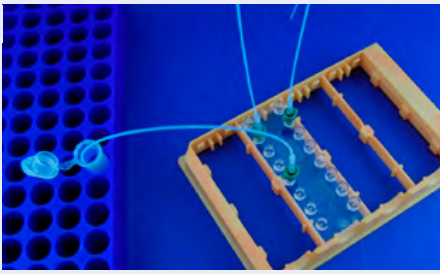


Fig. 572: Insertion of the Luer with tubings in fluid exit of the chip and connection of tube with sampling vessel

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.

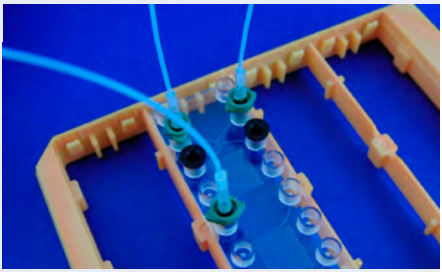


Fig. 573: Close unused fluid ports on chip with red Luer plugs

Step 7: Connect chip with pump

7. Connect the PTFE tube with the tube inserted in the pump

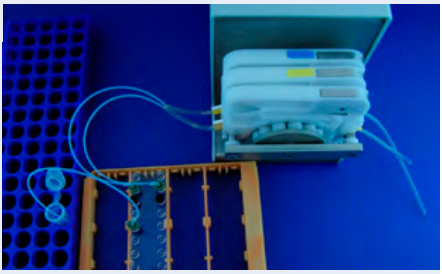


Fig. 574: Connection of the chip via the PTFE tube with the pump

Step 8: Connect pump with reservoir and start pumping

Female Luer interface combined with male Luer counterpart

8. Connect the end of the pump tube with a further PTFE tube, insert the PTFE tube in your reagent vessel and start pumping.

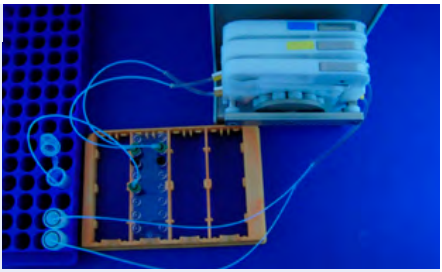


Fig. 575: Connection of pump via a PTFE tube with a liquid reservoir

16.1.3 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 Luer interface, e.g. micro mixer chip (01-0190-0138-01)
2. Handling frame, e.g. orange (15-4001-0000-12)
3. Silicone tube, e.g. ID: 0.5 mm (29-0611-0000-08)
4. PTFE tube, e.g. ID: 0.5 mm (29-0803-0000-16)
5. Peristaltic pump
6. Tube for peristaltic pump
7. Eppendorf vessel

Fig. 576: Microfluidic chip with olive connected to different chip types

Step 1: Chip & handling frame

1. Insert the chip in a handling frame

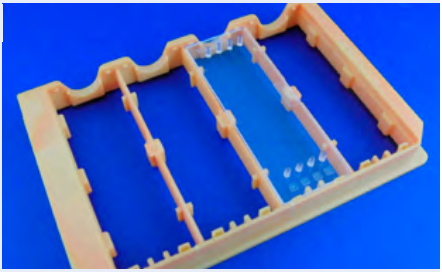


Fig. 577: Microfluidic chip with olive interfaces inserted in a microfluidic chip handling frame

Step 2: Connect PTFE tubes with silicone sleeves

2. Connect two times a short silicone tube with a longer PTFE tube

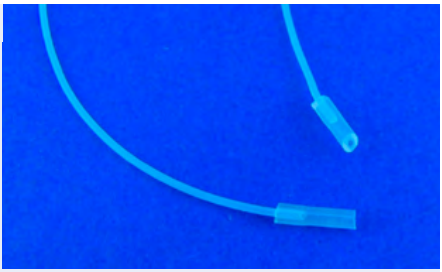


Fig. 578: Short pieces of silicone tubes connected with PTFE tube

Step 3: Interface chip & tube

3. Interface the olives on chip through the silicone sleeves with the PTFE tube

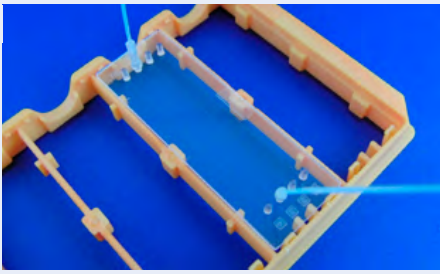


Fig. 579: Chip with olive interfaces connected with tubes

Step 4: Insert tube in pump tube

4. Insert the PTFE tube in the tube of the pump

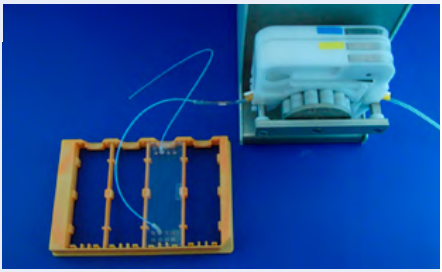


Fig. 580: Chip with olives connected via tubes to a peristaltic pump

Step 5: Tube, pump & reservoir vessel

5. Connect the tube of the pump with a PTFE tube with the reservoir vessel

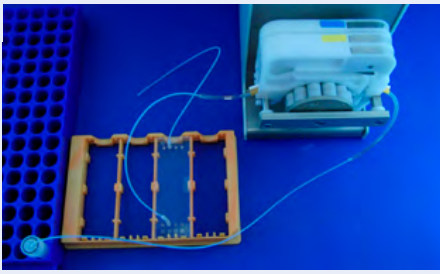


Fig. 581: Pump tube connected to reservoir vessel

Step 6: Connection collection vessel & start pumping

6. Connect the exit tube with a collection vessel and start pumping

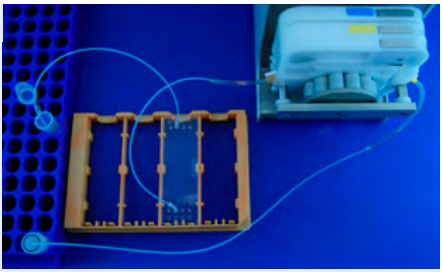


Fig. 582: Chip with olives connected via tubes to pump addressing a reservoir vessel and the exit port tube is inserted in a collection vessel

16.2 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), (13-1002-0162-03)
2. Handling frame, e.g. orange (15-4001-0000-12)
3. Male Mini Luer fluid connectors, e.g. the green version (09-0541-0331-09)
4. Male Mini Luer fluid connectors, e.g. the opaque version (09-0538-0331-09)
5. Male Mini Luer plugs, e.g. the red version (09-0551-0334-09)
6. Silicone tube, e.g. ID: 0.5 mm ((29-0611-0000-08)
7. PTFE tube, e.g. ID: 0.5 mm (29-0803-0000-16)
8. Oil, e.g. 20-5004-0000-00
9. T-piece for tubing
10. Fluorescence dye
11. Peristaltic pump
12. Tube for peristaltic pump
13. Two channel syringe pump or two syringe pumps
14. Eppendorf vessel
15. Microscope
16. Computer

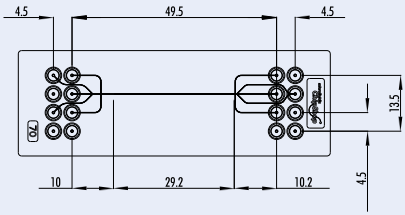


Fig. 583: Droplet generator chip 162

Step 1: Chip & handling frame

1. Insert the chip in a handling frame

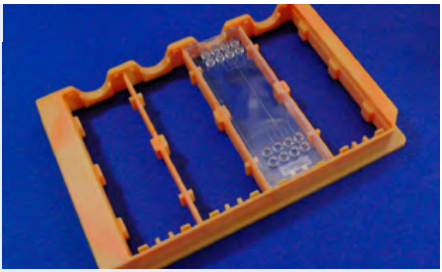


Fig. 584: Droplet generator 162 placed in handling frame

Step 2: Interface chip & pump for aqueous phase

2. Connect the central entrance for the aqueous phase via an opaque Mini Luer connector, a silicone sleeve, a PTFE tube, the pump tube and a further PTFE to the pump containing the aqueous phase (e.g. sample with dyed).

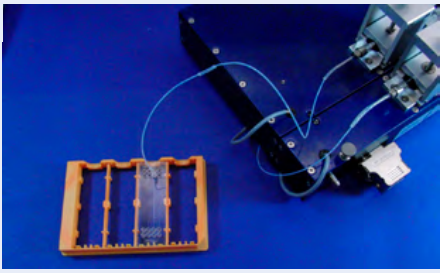


Fig. 585: Central entrance of the droplet generator chip conneted to the pump

Step 3: Interface chip & pump for oil phase

3. Connect the ports for the oil phase via green Mini Luer connectors, silicone sleeves, PTFE tube, the splitting T-piece, the pump tube and a further PTFE to the pump containing the oil phase.

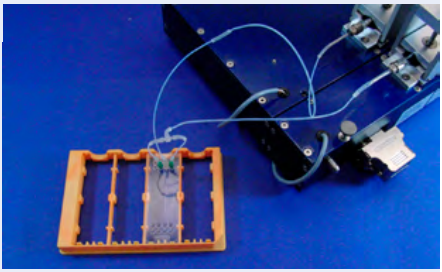


Fig. 586: Side ports for oil phase of the droplet generator chip connected to the pump

Step 4: Close redundant exit ports

4. Plug all unused entrance ports and exit ports of the chip with Mini Luer plugs besides the central exit port.

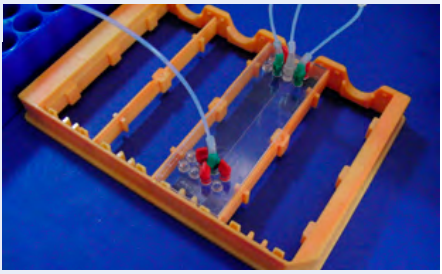


Fig. 587: Droplet generator with all redundant exit ports closed

Step 5: Interface chip & collection vessel

5. Connect the exit port via a Mini Luer connector, a silicone sleeve, and a PTFE tube to the Eppendorf waste reservoir

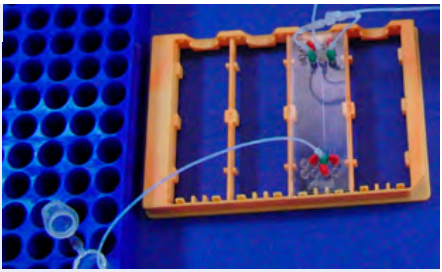


Fig. 588: Exit port of the droplet generator connected to a collecti7n vessel

Step 6 – 7: Carry out experiment

6. Start pumping the oil and wait for a stable flow.
7. Start pumping the aqueous phase and observe droplet generation. You have to eventually vary the flow rate of the aqueous phase to generate droplets of the desired size.

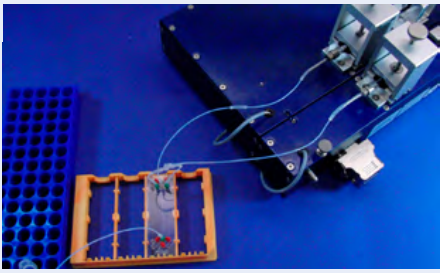


Fig. 589: Complete experimental set-up

Step 8: Visualisation of the experiments

8. Visualize the experiment with a fluorescence microscope and characterize the droplet size.

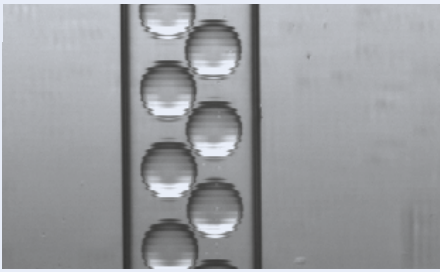


Fig. 590: Droplets generated on chip

16.3 ChipGenie® edition P: On-chip DNA-isolation with magnetic beads

This procedure describes the generation of genomic DNA e.g. for downstream PCR out of a variety of samples such as blood or pathogen-containing liquids. Magnetic beads inside a microfluidic chip bind the DNA from cells (blood cells or bacteria) lysed inside the chip. Washed, pure DNA is extracted from beads and the chip.

Depending on sample and application the single steps vary slightly.

16.3.1 On-chip DNA-isolation from full blood with ChipGenie® edition P starter kit 4

Starting with full blood the **ChipGenie® edition P starter kit 4** allows for an on-chip isolation of PCR-competent genomic DNA in less than 15 minutes.

Required tools & ingredients:

1. ChipGenie® edition P instrument (08-0487-0000-00, 695.00 €)
2. ChipGenie® edition P starter kit 3 – DNA extraction – THREE STEP PROCEDURE (11-0817-0000-00, 460.00 €)
3. A waste reservoir

The application procedure includes:

1. The preparation steps for the chip
2. The on-chip lysis and purification
3. The DNA elution

Preparation steps 1:

1. Close one inlet and one outlet port of the chamber with a Mini Luer plug.

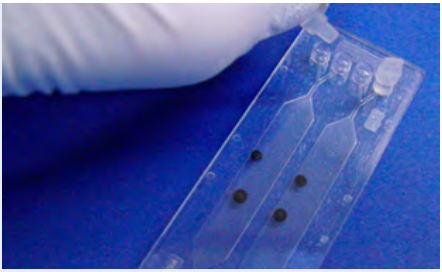


Fig. 591: Chip for 120 µl sample volume with ready-made beads

Preparation steps 2:

2. Place chip into the ChipGenie® P instrument.
3. If you would like to work with a pump: After closure of the frame, insert Mini Luer-connectors into the open outlet ports of the chip.

Fig 592: Chip inserted in ChipGenie® edition P

Lysis and purification:

4. Incubate 40 µl whole blood, 60 µl mcs lysis & binding buffer & 20 µl mcs wash buffer 2 off-chip.
5. Fill the complete reaction mixture into one of the two rhombic chambers of the chip.
6. Start the magnet and run mixing for 5 min.
7. Stop magnet.
8. Empty the chamber with air with the help of a pipette.
9. Fill the chamber with 120 µl mcs wash buffer 1.
10. Start magnet for 30 sec.
11. Stop magnet.
12. Repeat steps 9-11 two more times.

Fig 593: Chip and ChipGenie® edition P during sample loading

DNA elution:

13. Fill the chamber with 50 µl mcs elution buffer.
14. Set the temperature to 55 °C.
15. Start magnet for 5 min.
16. Stop magnet.
17. Disconnect the Mini Luer-connector from the outlet port and aspirate the eluate with the help of a pipette.

Fig. 594: Beads on chip during clean-up and elution

16.4 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.

16.4.1 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 (15-1504-0200-02)
2. Mini Luer plugs (09-0550-0334-09)
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.

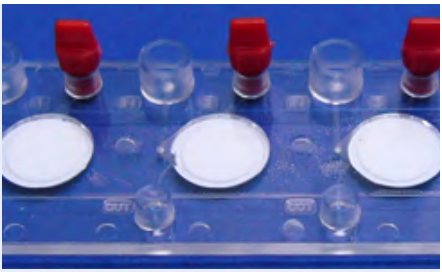


Fig 595: Membrane chip Fl. 200 with Mini Luer plugs

Sample loading:
Pipette the designated volume (between 20 and 40 µl) of whole blood into Luer-inlet-port of the membrane chip.

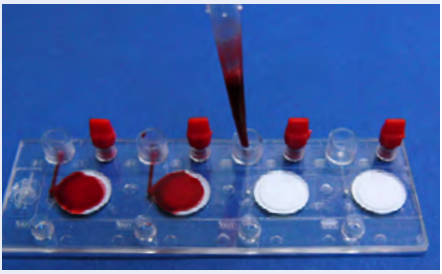


Fig 596: Insertion of blood in membrane chip

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.

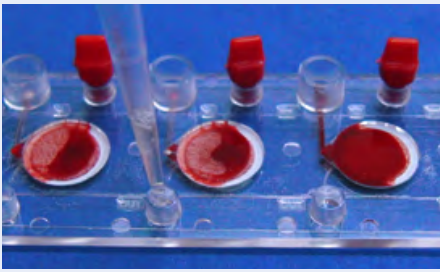


Fig 597: Plasma take up

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.

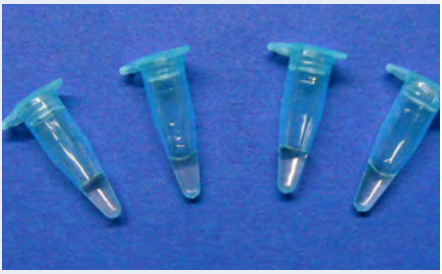


Fig 598: On-chip generated plasma

16. 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

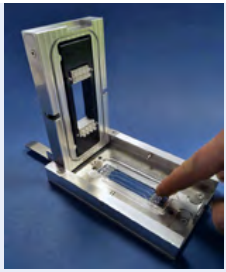


Fig 599: Rhombic chamber chip placed in Lab-on-a-Chip Cell Culture Incubator – LOC CCI 1

Preparation step:
Connect chip and Lab-on-a-Chip Cell Culture Incubator LOC-CCI 1 with external pumps

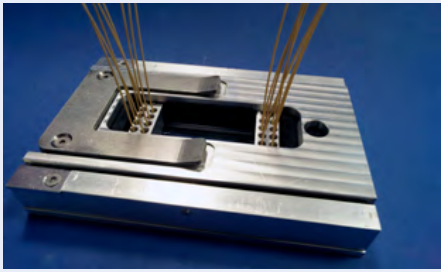


Fig 600: Lab-on-a-Chip Cell Culture Incubator – LOC CCI 1 with embedded chip and capillaries for the connection of pumps

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 601: Lab-on-a-Chip Cell Culture Incubator – LOC CCI 1 during use on microscope stage

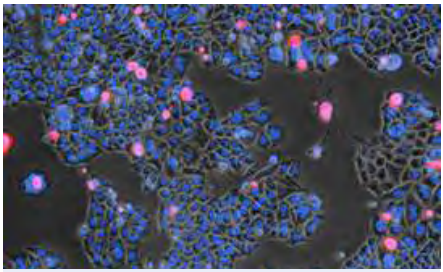


Fig 602: Cell culture carried out in CO_2-incubator

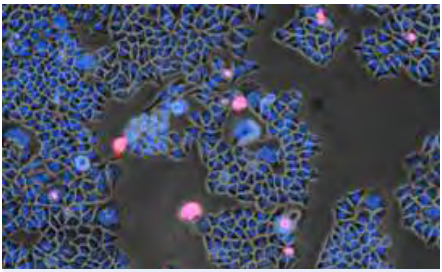


Fig 603: Cell culture done in Lab-on-a-Chip Cell Culture Incubator – LOC CCI 1

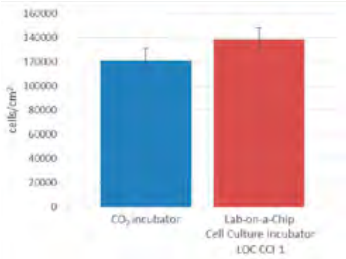
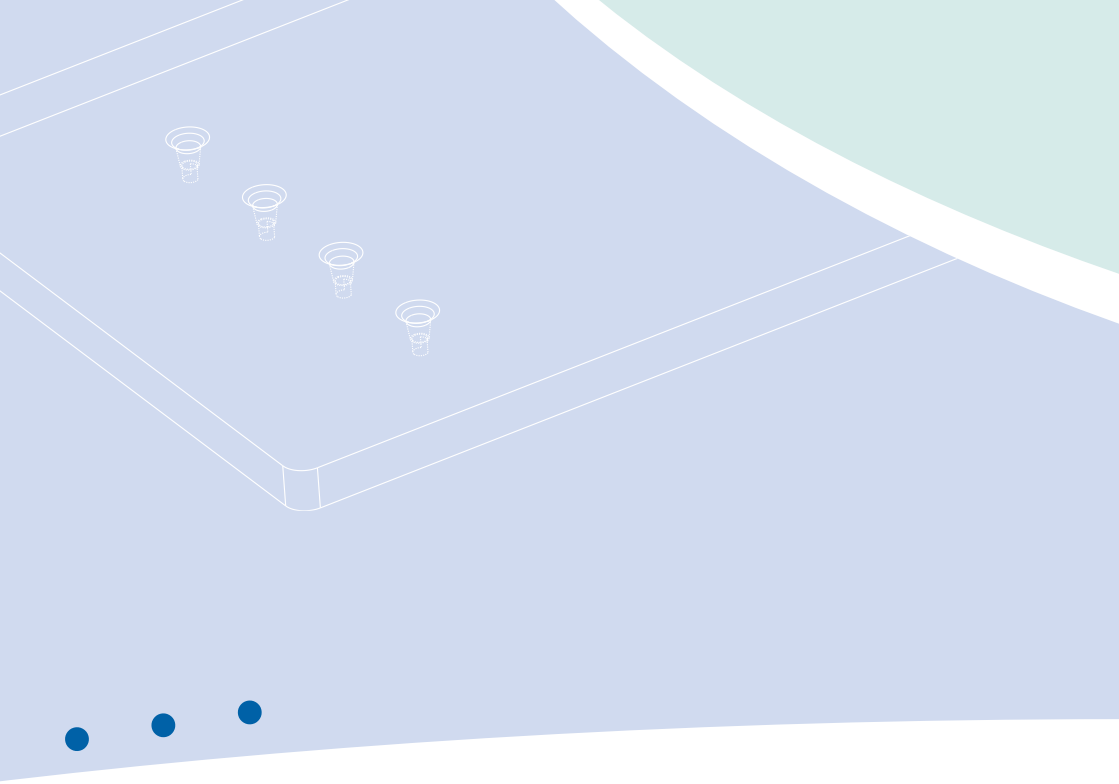
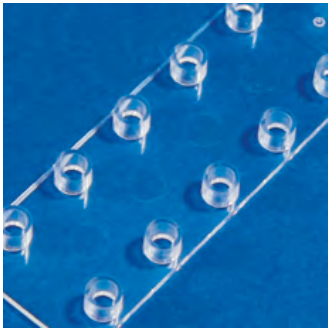


Fig 604: Comparison of cell culture done in CO_2-incubator and Lab-on-a-Chip Cell Culture Incubator – LOC CCI 1

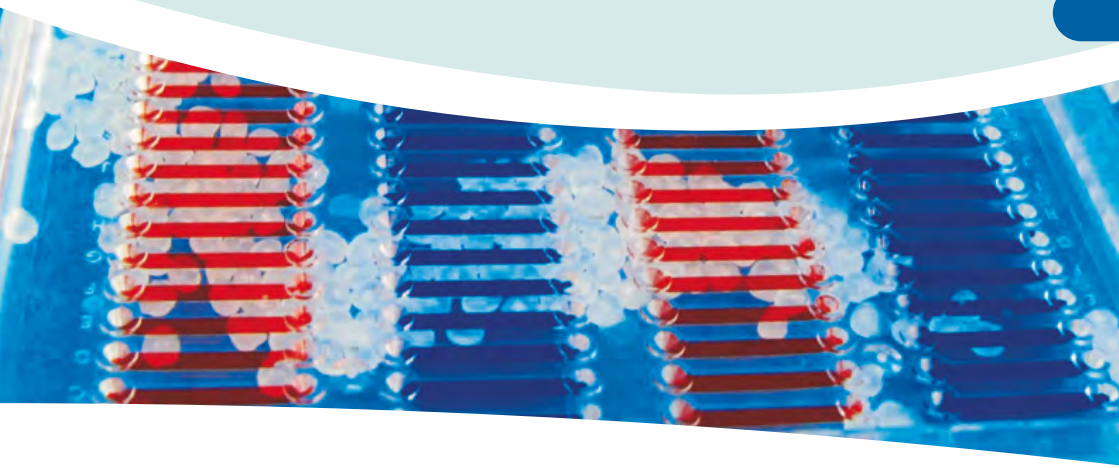
That CO_2-independent cultivation of cells in the Lab-on-a-Chip Cell Culture Incubator – LOC CCI 1 leads to slightly increased proliferation in comparison to common CO_2-incubator-based cell culture.

Product Code	Description	Detail		Price [€]
22-4500-0000-00	Lab-on-a-Chip Cell Culture Incubator – LOC-CCI 1			1,485.00
11-0826-0000-00	LOC-CCI 1 starter kit 1	- Male Mini Luer plugs, red, material: PP (10)	09-0551-0334-09	638.32
		- Rhombic chamber chip, 120 µl chamber volume, 500 µm channel depth, hydrophilized, material: Topas (10)	12-0906-0172-02	
		- Rhombic chamber chip, 100 µl chamber volume, 600 µm channel depth, hydrophilized, material: Topas (10)	12-0913-0221-02	
		- Rhombic chamber chip, 250 µl chamber volume, 800 µm channel depth, hydrophilized, material: Topas (10)	12-0919-0194-02	





17 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 **17.1 General design guidelines for polymer-based microfluidic devices** helps you to judge the feasibility of design features of microfluidic chips.

Chapter **17.2 Fluidic platforms for custom design** 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.

17.1 General design guidelines for polymer-based microfluidic devices

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.

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.

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 $< 100\ \mu$m. 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 (see Fig. 602) 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. 602) are possible.

Fig. 605: Through-holes, open and structured areas

17.1.1 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. 603) 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. 603), to create an optical finish (roughness < 50 nm RMS).

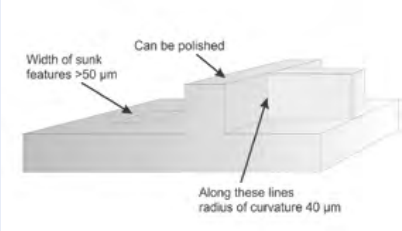


Fig. 606: Features of a milled mold insert

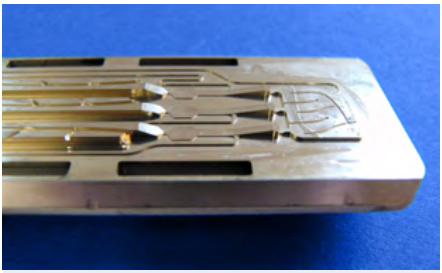


Fig. 607: Mold insert realised using ultraprecision mechanical machining

17.1.2 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.

17.2 Fluidic platforms for custom design

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.

17.2.1 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.

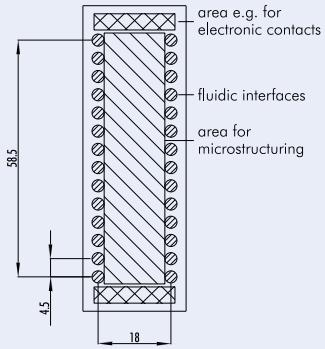


Fig. 608: Principle drawing of a microscopy slide with fluidic interfaces – in this version, fluidic interfaces are grouped along the long sides of the chip.

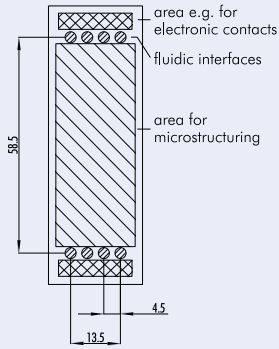


Fig. 609: Principle drawing of a microscopy slide with fluidic interfaces – in this version,fluidic interfaces are grouped along the short sides of the chip

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.

17.2.1.1 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.

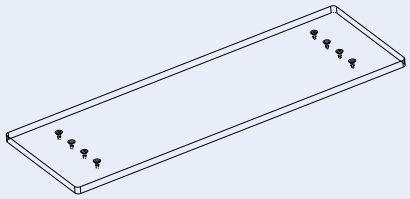


Fig. 610: Microscopy slide through-hole platform – version with eight fluidic interfaces

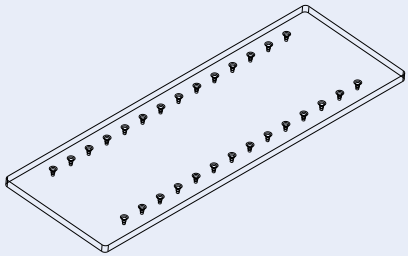


Fig. 611: Microscopy slide through-hole platform – version with 28 fluidic interfaces

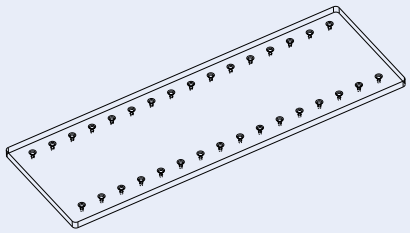


Fig. 612: Microscopy slide through-hole platform – version with 32 fluidic interfaces

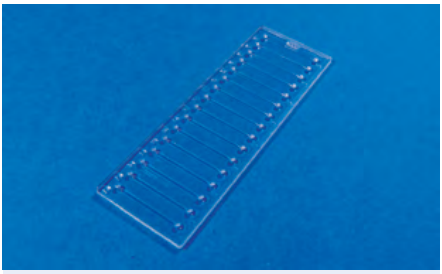


Fig. 613: Example of microscopy slide through-hole platform with 32 through-holes

Product Code	Description	Material	Price [€] 1+	10+
10-1100-0339-01	Microscopy slide platform 2 x 4 through-holes, pack of 10 slides	PMMA	55.00	30.00
10-1101-0339-03	Microscopy slide platform 2 x 4 through-holes, pack of 10 slides	PC	55.00	30.00
10-1102-0339-02	Microscopy slide platform 2 x 4 through-holes, pack of 10 slides	Topas	55.00	30.00
10-1103-0339-05	Microscopy slide platform 2 x 4 through-holes, pack of 10 slides	Zeonor	55.00	30.00
10-1104-0435-01	Microscopy slide platform 2 x 14 through-holes, pack of 10 slides	PMMA	55.00	30.00
10-1105-0435-03	Microscopy slide platform 2 x 14 through-holes, pack of 10 slides	PC	55.00	30.00
10-1106-0435-02	Microscopy slide platform 2 x 14 through-holes, pack of 10 slides	Topas	55.00	30.00
10-1107-0435-05	Microscopy slide platform 2 x 14 through-holes, pack of 10 slides	Zeonor	55.00	30.00
10-1108-0345-01	Microscopy slide platform 2 x 16 through-holes, pack of 10 slides	PMMA	55.00	30.00
10-1109-0345-03	Microscopy slide platform 2 x 16 through-holes, pack of 10 slides	PC	55.00	30.00
10-1110-0345-02	Microscopy slide platform 2 x 16 through-holes, pack of 10 slides	Topas	55.00	30.00
10-1111-0345-05	Microscopy slide platform 2 x 16 through-holes, pack of 10 slides	Zeonor	55.00	30.00

17.2.1.2 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.

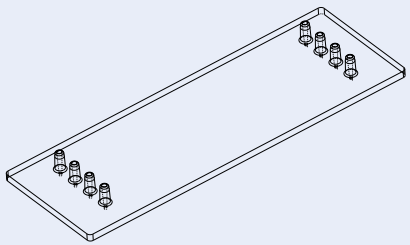


Fig. 614: Microscopy slide olive platform – version with eight fluidic interfaces

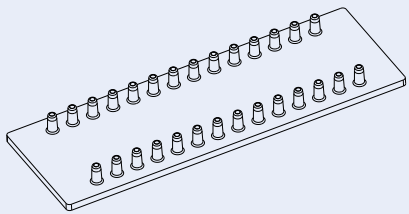


Fig. 615: Microscopy slide olive platform – version with 28 fluidic interfaces

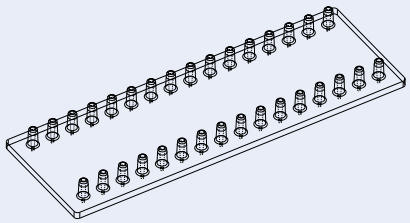


Fig. 616: Microscopy slide olive platform – version with 32 fluidic interfaces

Fig. 617: Example of microscopy slide olive platform with 28 olive fittings

Product Code	Description	Material	Price [€] 1+	10+
10-1112-0337-01	Microscopy slide platform 2 x 4 olives, pack of 10 slides	PMMA	55.00	30.00
10-1113-0337-03	Microscopy slide platform 2 x 4 olives, pack of 10 slides	PC	55.00	30.00
10-1114-0337-02	Microscopy slide platform 2 x 4 olives, pack of 10 slides	Topas	55.00	30.00
10-1115-0337-05	Microscopy slide platform 2 x 4 olives, pack of 10 slides	Zeonor	55.00	30.00
10-1116-0341-01	Microscopy slide platform 2 x 14 olives, pack of 10 slides	PMMA	55.00	30.00
10-1117-0341-03	Microscopy slide platform 2 x 14 olives, pack of 10 slides	PC	55.00	30.00
10-1118-0341-02	Microscopy slide platform 2 x 14 olives, pack of 10 slides	Topas	55.00	30.00
10-1119-0341-05	Microscopy slide platform 2 x 14 olives, pack of 10 slides	Zeonor	55.00	30.00
10-1120-0343-01	Microscopy slide platform 2 x 16 olives, pack of 10 slides	PMMA	55.00	30.00
10-1121-0343-03	Microscopy slide platform 2 x 16 olives, pack of 10 slides	PC	55.00	30.00
10-1122-0343-02	Microscopy slide platform 2 x 16 olives, pack of 10 slides	Topas	55.00	30.00
10-1123-0343-05	Microscopy slide platform 2 x 16 olives, pack of 10 slides	Zeonor	55.00	30.00

17.2.1.3 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.

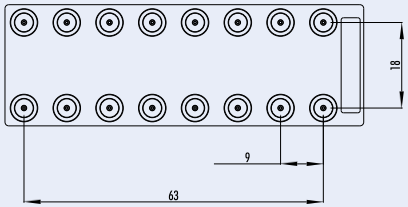


Fig. 618: Microscopy slide Luer platform – version 16 fluidic interfaces

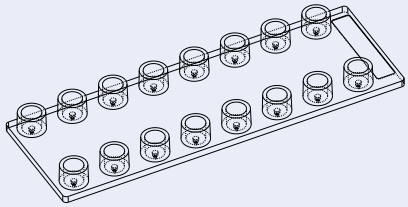


Fig. 619: Microscopy slide Luer platform – version 16 fluidic interfacs

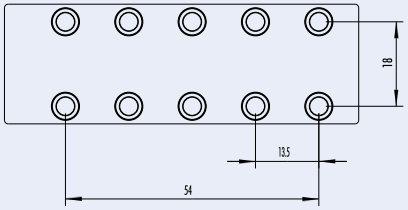


Fig. 620: Detail of the microscopy slide Luer platform with ten fluidic interfaces

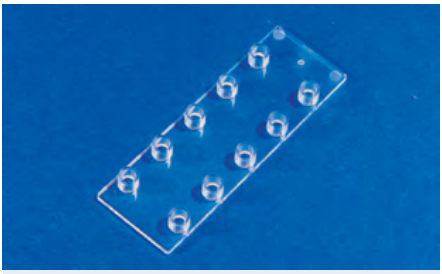


Fig. 621: Example of microscopy slide Luer platform with ten Luer interfaces

Product Code	Description	Material	Price [€] 1+	10+
10-1124-0348-01	Microscopy slide platform 2 x 5 Luer connectors, pack of 10 slides	PMMA	55.00	30.00
10-1125-0348-03	Microscopy slide platform 2 x 5 Luer connectors, pack of 10 slides	PC	55.00	30.00
10-1126-0348-02	Microscopy slide platform 2 x 5 Luer connectors, pack of 10 slides	Topas	55.00	30.00
10-1127-0348-05	Microscopy slide platform 2 x 5 Luer connectors, pack of 10 slides	Zeonor	55.00	30.00
10-1128-0346-01	Microscopy slide platform 2 x 8 Luer connectors, pack of 10 slides	PMMA	55.00	30.00
10-1129-0346-03	Microscopy slide platform 2 x 8 Luer connectors, pack of 10 slides	PC	55.00	30.00
10-1130-0346-02	Microscopy slide platform 2 x 8 Luer connectors, pack of 10 slides	Topas	55.00	30.00
10-1131-0346-05	Microscopy slide platform 2 x 8 Luer connectors, pack of 10 slides	Zeonor	55.00	30.00

17.2.1.4 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. 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.

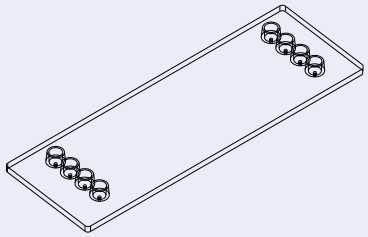


Fig. 622: Microscopy slide Mini Luer platform – version with eight fluidic interfaces

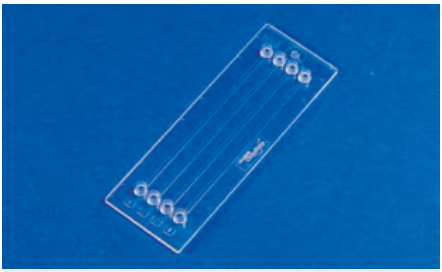


Fig. 623: Microscopy slide Mini Luer platform – version with eight fluidic interfaces

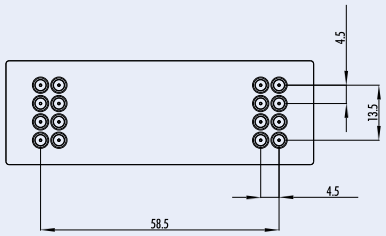


Fig. 624: Microscopy slide Mini Luer platform – version with 16 fluidic interfaces on the short edges

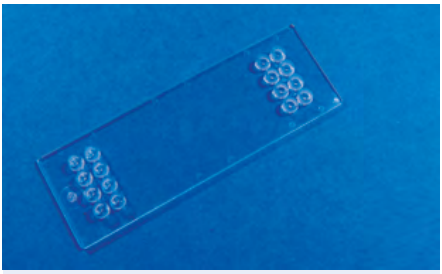


Fig. 625: Microscopy slide Mini Luer platform – version with 16 fluidic interfaces on the short edges

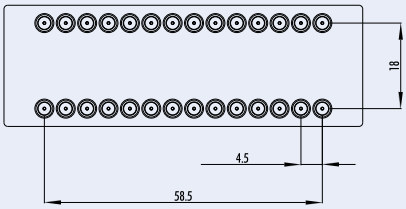


Fig. 626: Microscopy slide Mini Luer platform – version with 28 fluidic interfaces on the long edges

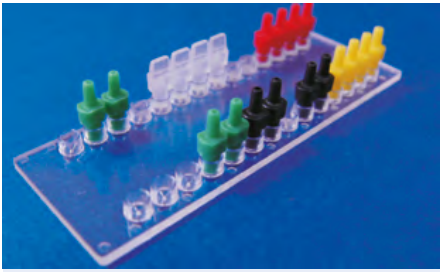


Fig. 627: Microscopy slide Mini Luer platform – version with 28 fluidic interfaces on the long edges

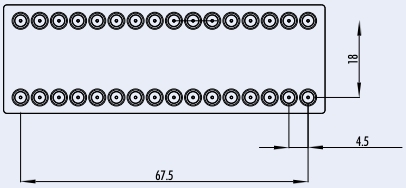


Fig. 628: Microscopy slide Mini Luer platform – version with 32 fluidic interfaces on the short edges

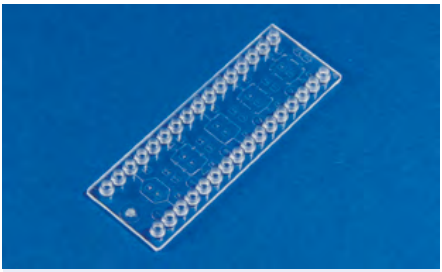


Fig. 629: Microscopy slide Mini Luer platform – version with 32 fluidic interfaces on the short edges

Product Code	Description	Material	Price [€] 1+	10+
10-1132-0338-01	Microscopy slide platform 2 x 4 Mini Luer, pack of 10 slides	PMMA	55.00	30.00
10-1133-0338-03	Microscopy slide platform 2 x 4 Mini Luer, pack of 10 slides	PC	55.00	30.00
10-1134-0338-02	Microscopy slide platform 2 x 4 Mini Luer, pack of 10 slides	Topas	55.00	30.00
10-1135-0338-05	Microscopy slide platform 2 x 4 Mini Luer, pack of 10 slides	Zeonor	55.00	30.00
10-1136-0340-01	Microscopy slide platform 2 x 8 Mini Luer, pack of 10 slides	PMMA	55.00	30.00
10-1137-0340-03	Microscopy slide platform 2 x 8 Mini Luer, pack of 10 slides	PC	55.00	30.00
10-1138-0340-02	Microscopy slide platform 2 x 8 Mini Luer, pack of 10 slides	Topas	55.00	30.00
10-1139-0340-05	Microscopy slide platform 2 x 8 Mini Luer, pack of 10 slides	Zeonor	55.00	30.00
10-1140-0342-01	Microscopy slide platform 2 x 14 Mini Luer, pack of 10 slides	PMMA	55.00	30.00
10-1141-0342-03	Microscopy slide platform 2 x 14 Mini Luer, pack of 10 slides	PC	55.00	30.00
10-1142-0342-02	Microscopy slide platform 2 x 14 Mini Luer, pack of 10 slides	Topas	55.00	30.00
10-1143-0342-05	Microscopy slide platform 2 x 14 Mini Luer, pack of 10 slides	Zeonor	55.00	30.00
10-1144-0344-01	Microscopy slide platform 2 x 16 Mini Luer, pack of 10 slides	PMMA	55.00	30.00
10-1145-0344-03	Microscopy slide platform 2 x 16 Mini Luer, pack of 10 slides	PC	55.00	30.00
10-1146-0344-02	Microscopy slide platform 2 x 16 Mini Luer, pack of 10 slides	Topas	55.00	30.00
10-1147-0344-05	Microscopy slide platform 2 x 16 Mini Luer, pack of 10 slides	Zeonor	55.00	30.00

17.2.2 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. The platform is equipped with two double rows of 10 Mini Luer interfaces allowing for a large variety of fluidic interconnects in the development phase.

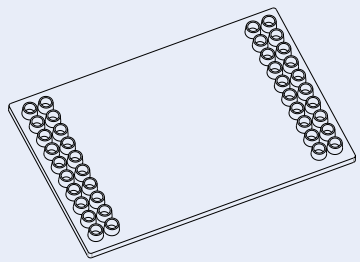


Fig. 630: Schematic drawing of double slide format - Fluidic 508

Product Code	Description	Material	Price [€] 1+	10+
10-1148-0508-01	Double slide platform 40 Mini Luer interfaces, pack of 10 substrates	PMMA	76.00	44.50
10-1149-0508-02	Double slide platform 40 Mini Luer interfaces, pack of 10 substrates	Topas	76.00	44.50
10-1150-0508-03	Double slide platform 40 Mini Luer interfaces, pack of 10 substrates	PC	76.00	44.50
10-1151-0508-05	Double slide platform 40 Mini Luer interfaces, pack of 10 substrates	Zeonor	76.00	44.50

17.2.3 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.

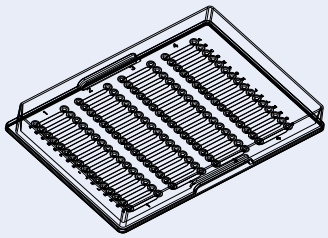


Fig. 631: Schematic drawing of one microfluidic microtiter plate

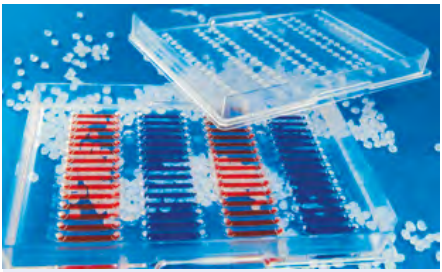


Fig. 632: Example of one of *microfluidic ChipShop's* microfluidic microtiter plates

17.2.4 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.

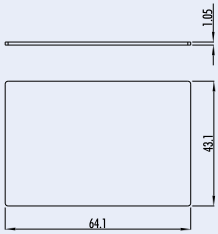


Fig. 633: Schematic drawing of 1/4 microtiter-plate

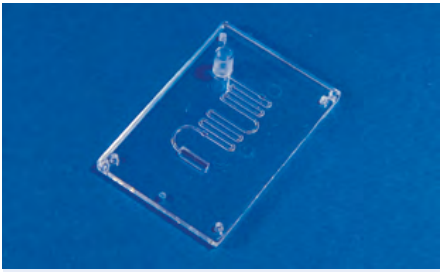


Fig. 634: Example for 1/4 microtiter-plate, realized within EU-FP7 project "CD-Medics", No. 216031. Design: IMM

17.2.5 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.

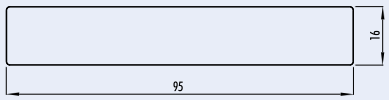


Fig. 635: Schematic drawing of the extended size I platform with simple through-holes

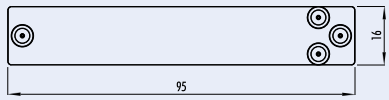


Fig. 636: Schematic drawing of the extended size I platform with Luer interfaces

17.2.6 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.

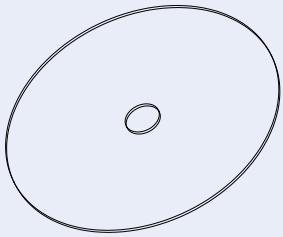


Fig. 637: Schematic drawing of the CD-platform

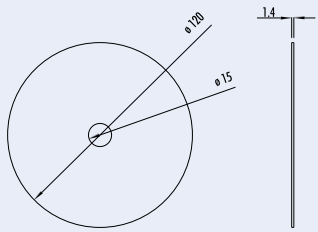


Fig. 638: CD-platform with measures

17.2.7 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.

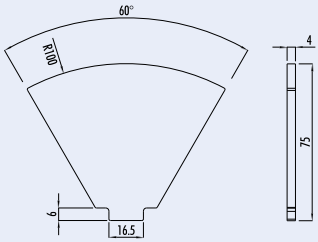


Fig. 639: Geometrical layout of the pie slice plate

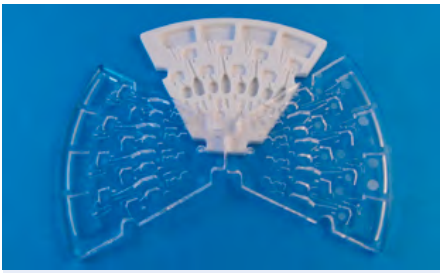
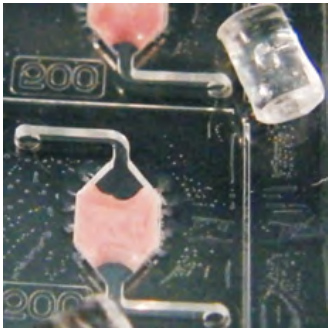
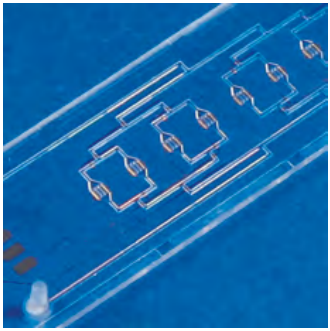


Fig. 640: Examples of pie slice plate chips.
The chips were developed within the BMBF-Project "ZentriLab", FKZ 16SV2350.





18 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.

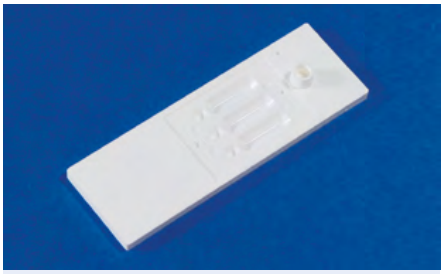


Fig. 641: Diagnostic platform with Luer connectors

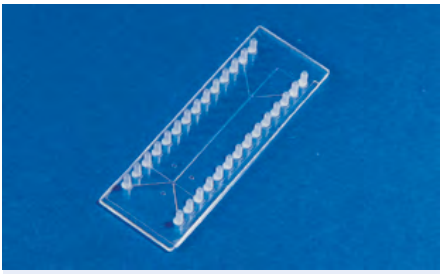


Fig. 642: Cell sorting chip

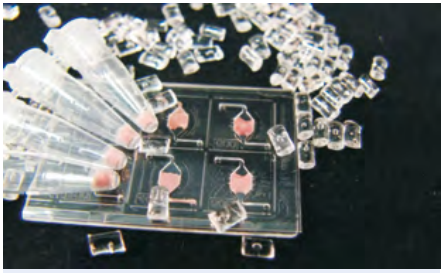


Fig. 643: PCR chip with integrated freeze-dried master mix

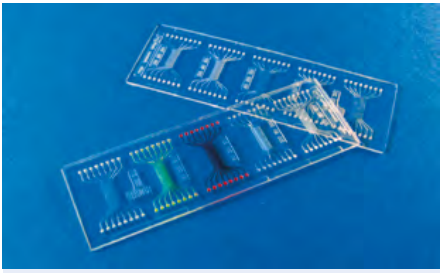


Fig. 644: Channel-array chip

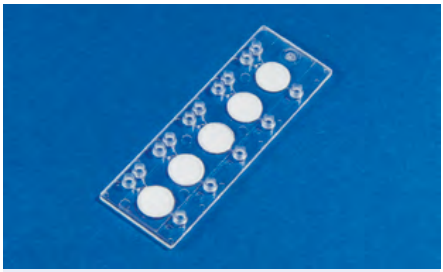


Fig. 645: Hybrid chip consisting of polymer and filters for plasma generation

Fig. 646: Continuous-flow PCR chip, chip, realized within the BMBF-Project "ChipFlussPCR", FKZ 13N9556

Fig. 647: Hybrid chip for immunoassays with electrochemical detection, realized within the EU-FP6 project "SmartHEALTH", No. 016817

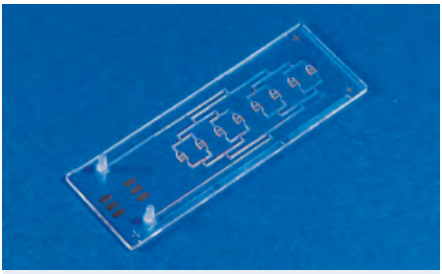


Fig. 648: Cell culture chips with integrated thin film electrodes, realized within the BMBF-Project "HepaChip", FKZ 01GG0728

Fig. 649: Hybrid chip for immunoassays with plasma generation unit for electrochemical detection, realized within EU-FP6 project "SmartHEALTH", No. 016817

Fig. 650: Two component microinjection molding – Device for agglutionation based assays, realized within the BMBF project FASAMOS, FKZ 02PC2001

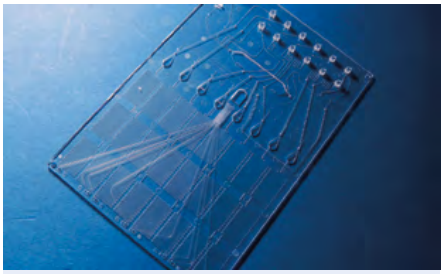


Fig. 651: Sample-in-result-out DNA-analysis chip, realized within the BMBF project ChipFlussPCR, FKZ 13N9556

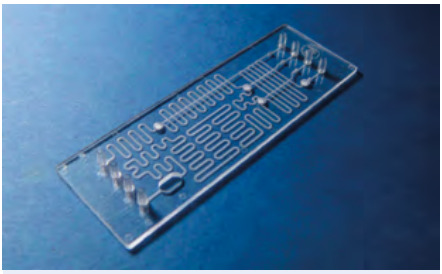


Fig. 652: Microfluidic chip for a complete SELEX-cycle, realized within the ETB project Artamis, FKZ 03139428

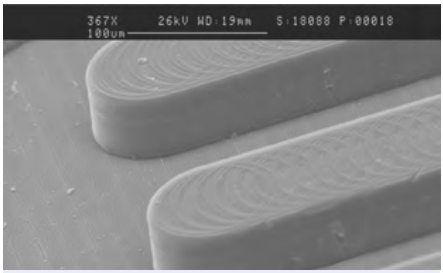


Fig. 653: Microchannel with nanostructured channel floor. The nanostructures have a 1.2 μm period and 200 nm height

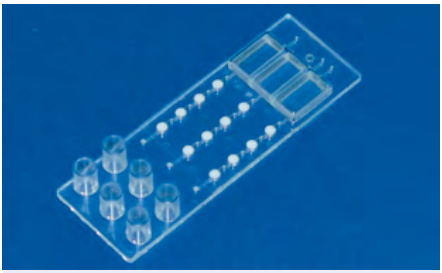


Fig. 654: Microfluidic chip for immunoassay applications with reagent reservoirs and antibody-coated frits for three assays, realized within the BMBF project IFSA, FKZ 16SV5417

Fig. 655: Sample-in-result-out DNA-analysis chip with hybridisation zone for optoelectronic read-out, realized within the project PathoID Chip, A-102-RT-GC

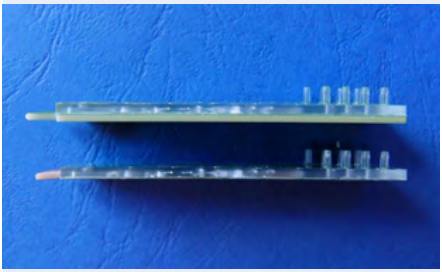


Fig. 656: Microfluidic chip coupled to conventional (top) and flex (bottom) PCBs, realized within the BMBF-project "SafeIS", FKZ 0315574C

Fig. 657: Filtration chip with liquid reservoir

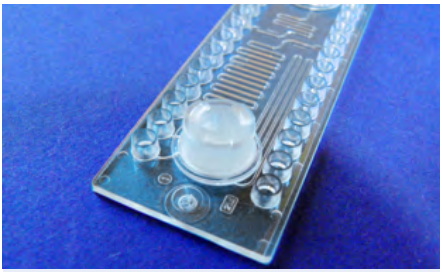


Fig. 658: Fluidic chip with rotary valve

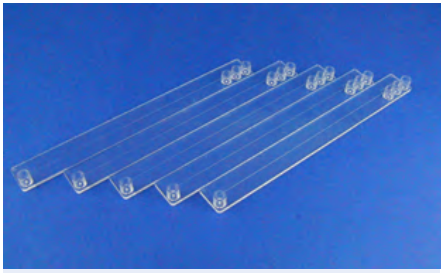


Fig. 659: Extended size electrophoresis chip for sequencing

Fig. 660: Immunoassay chip with plasma generation unit and blister pouches

Fig. 661: HLA typing chip for the detection of coeliac disease, realized within the FP 7 project "CD-Medics", No. 216031

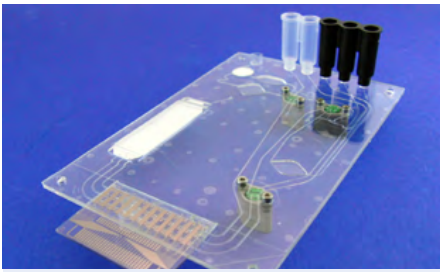


Fig. 662: Serology test chip for the detection of coeliac disease, realized within the FP 7 project "CD-Medics", No.216031

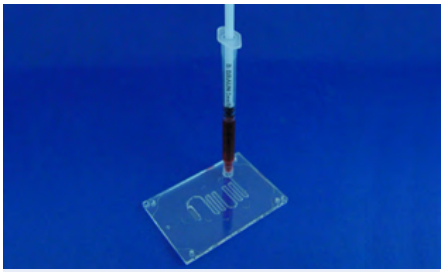


Fig. 663: Boyle-Mariotte PCR chip for ultrafast PCR, design: IMM, realized within the FP 7 project "CD-Medics", No. 216031

Fig. 664: Enyzme-assay development chip, realized within the FP 7 project Multisense Chip, No. 261810

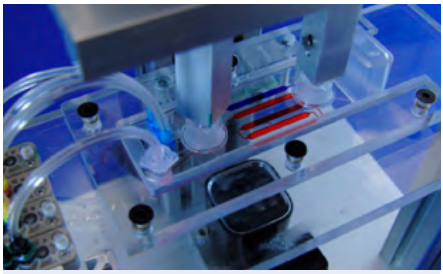


Fig. 665: Enzyme-assay development chip in bread board instrument, realized within FP 7 project Multisense Chip, No. 261810

Fig. 666: Microfluidic chip with lateral flow strip based detection and implemented blister for liquid storage

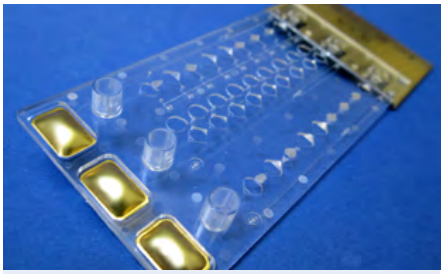


Fig. 667: PCR cartridge with TMR-sensor-based read-out , BMBF projekct MiniLab, No. 16SV4029

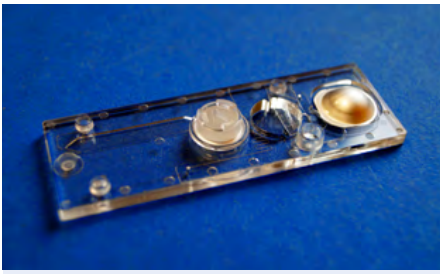


Fig. 668: Particle counting chip with integrated turning valve and staining solution, TAB project No. 2009 FE 0134

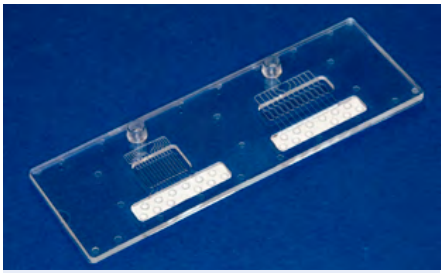


Fig. 669: Parallel PCR chip, FP 7 project Multisense Chip, No. 261810

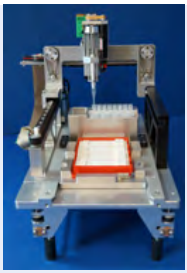


Fig. 670: Merger of standard liquid handling and lab-on-a-chip technology – LOC pipettor & xy-stage for optical read out, TAB project No. 2011 FE 9023

Fig. 671: Chip cuvette for frit-based immunoassays, realized within the BMBF project IFSA, FKZ 16SV5417

Fig. 672: Microfluidic chip realized for CARE-MAN - Health-CARE by biosensor Measurement and Networking, FP 6, NMP4-CT-2006-017333

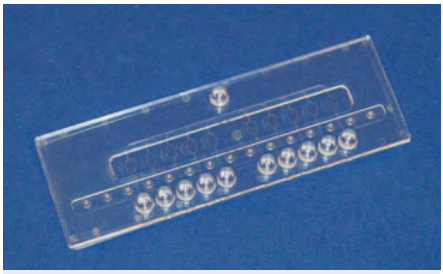


Fig. 673: One sample – 10 reactions: 0.5 µl volume PCR chip, FP 7 project Multisense Chip, No. 261810

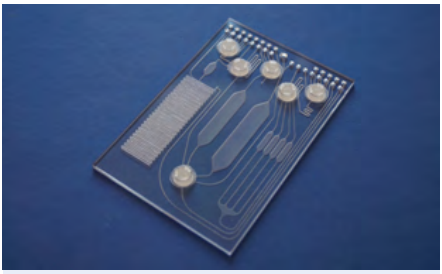


Fig. 674: Integrated microfluidic chip for continuous-flow PCR and parallel immunoassay, FP7 project Multisense Chip, No. 261810

Fig. 675: Breadboard system: Electrochemical immunoassay system for air sample analysis, FP7 project Multisense Chip, No. 261810

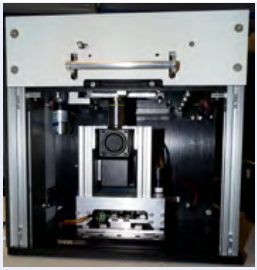


Fig. 676: Breadboard system: Lab-on-a-Chip instrument for optical read-out of immunoassays, TAB project LabChipIO

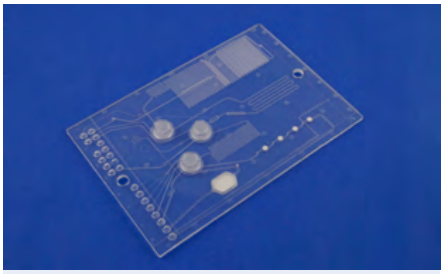


Fig. 677: Integrated microfluidic chip for the detection of bacterial pathogen on molecular and immunological level, FP7 project Multisense Chip, No. 261810

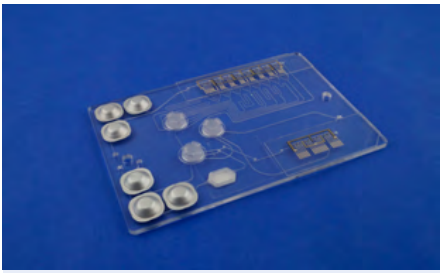


Fig. 678: Integrated microfluidic chip for the detection of bacterial pathogen on molecular and immunological level with integrated electrodes, FP7 project Multisense Chip, No. 261810

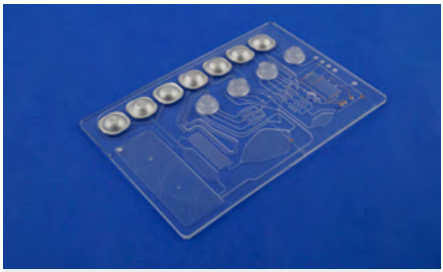


Fig. 679: Integrated microfluidic chip with complete sample preparation for miRNA analysis, BMBF project IMRA, FKZ 0316078A

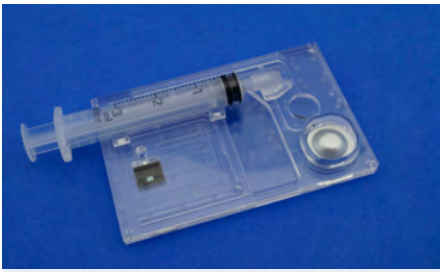


Fig. 680: Selective cell counting chip for hematology, BMBF project MrCyte, FKZ 13N12018

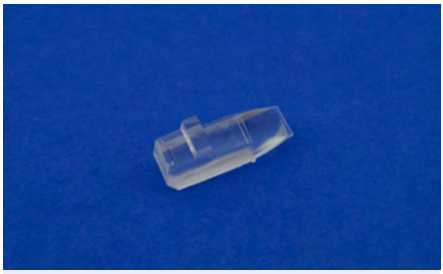


Fig. 681: Miniaturized spectrometer module, ChipGenie Optic TAB project 2013 FE 9021

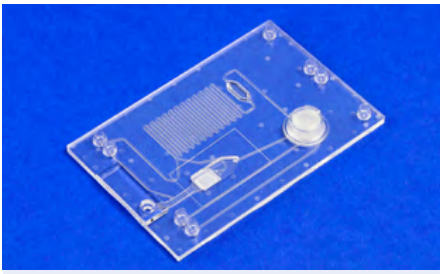


Fig. 682: Cartridge for CTC isolation and lysis. Realized within the EU-FP7 project „CanDo“, project number: 610472

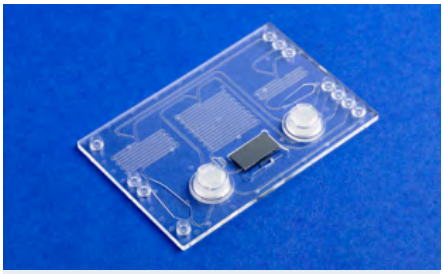


Fig. 683: Integrated cartridge for DNA amplification and subsequent detection using a silicone photonic sensor. Realized within the EU-FP7 project „CanDo“, project number: 610472

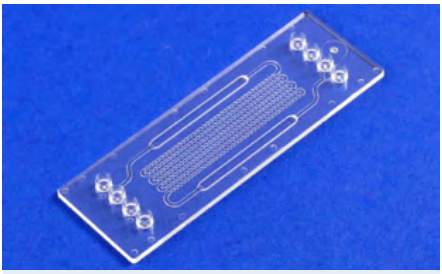


Fig. 684: Pearl chain mixer module. Realized within the EU-FP7 project „Nanodem“, Grant Agreement number: 318372

Fig. 685: Integrated microfluidic chip for the detection of bacterial pathogens, FP7 project Multisense Chip, No. 261810

Fig. 686: Multisense Chip Analyzer: Demonstration of detection of airborne bacterial pathogens, FP7 project Multisense Chip, No. 261810

Fig. 687: Integrated microfluidic chip for the detection of viral pathogens in the food supply chain, FP7 project EDEN, No. 313077

Fig. 688: Analyzer for molecular detection of viral pathogens in the food supply chain, FP7 project EDEN, No. 313077

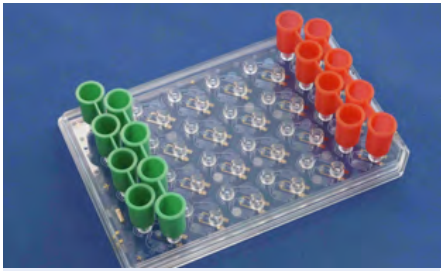


Fig. 689: Organ-on-chip device operated with hydrostatic fluid management, BMBF project HepaChip, FKZ 031A121D

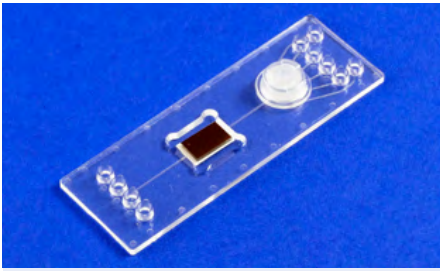


Fig. 690: Flow cell chip for sensor integration Realized within the BMBF project "Plasmosens", FKZ: 13N13734

Fig. 691: Immunoassay-Chip, BMBF-Project HandyLoC, FKZ 13N13714

Fig. 692: Immunoassay-Chip for mycotoxine analysis, BMBF-Project Kombispec, FKZ 13N13757

Fig. 693: Real-time PCR chip for B-agent detection, Horizon 2020 project, No. 700264

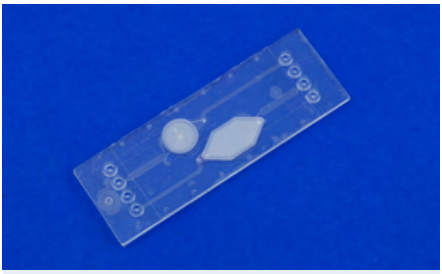


Fig. 694: Plasma generation chip, BMBF project Hämatoram, FKZ 13GW0112B

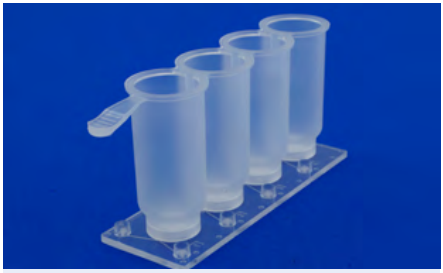
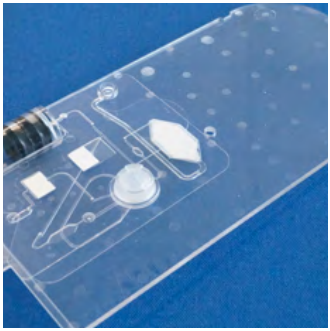


Fig. 695: Transwell membrane chip Fluidic 219 with tank Fluidic 234 as fluid reservoir, TAB project number 2013 FE 9021

Fig. 696: Transwell membrane chip Fluidic 219 with tank Fluidic 235 as fluid reservoir, TAB project number 2013 FE 9021



19 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?"

19 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.

19.1 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.

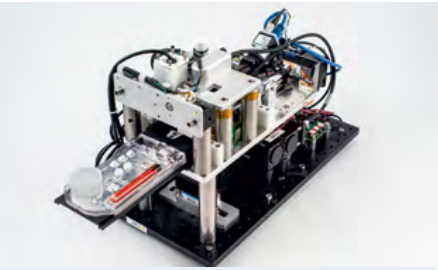


Fig. 697: Stratos breadboard unit – operating molecular, immunological and clinical chemistry assays

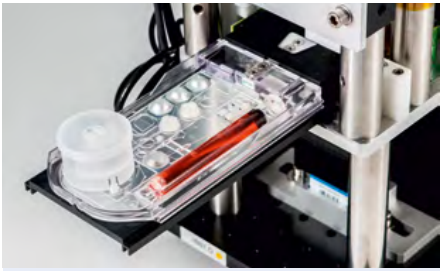
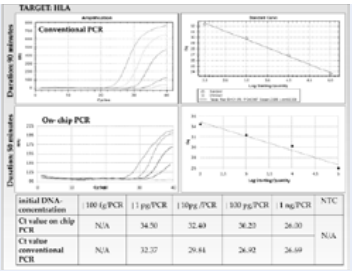


Fig. 698: *microfluidic ChipShop's* tuberculosis cartridge placed in the chip loader

Fig. 699: 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	26.23	26.30	N/A
Ct value conventional PCR	N/A	32.37	29.84	26.92	26.69	

Fig. 700: 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.

19.2 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. 701: ChipGenie® edition Dx instrument

Fig. 702: 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.

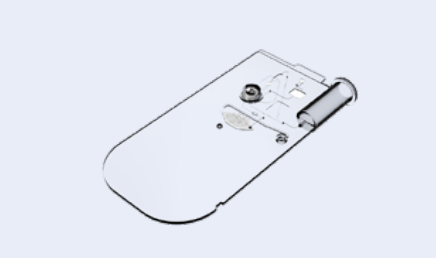


Fig. 703: ChipGenie® Dx cartridge – clinical chemistry assay

Fig. 704: ChipGenie® Dx cartridge – immunoassay

Fig. 705: ChipGenie® Dx cartridge – molecular assay (DNA-based)

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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20.1.2. Selected Conference Proceedings

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[2] Baldini F., et al., Novel fluorescence-based POCT platform for therapeutic drug monitoring in transplanted patients, Proc. SPIE 10072, 100720C, 2017.
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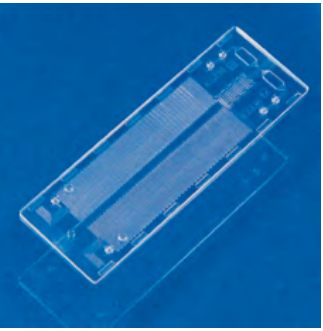
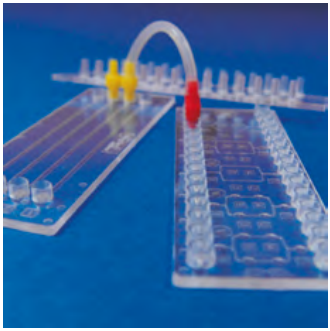



ChipShop



21 Order form

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Company:	Department:	
Contact Name:	Email:	
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City, State:	Zip Code:	Country:
Phone Number:	Fax Number:	
VAT Number (EU only):	Order Number:	

Product Number	Product Description	Material	Quantity	Unit Price [€]	Total Price [€]

Total amount without shipping cost and potential minimum quantity surcharge:	*
Minimum quantity surcharge for orders below € 250: € 15.00	
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Credit card fee: 3.5% on total invoice amount	
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* Minimum order volume: € 250 (below this amount we charge a € 15 minimum quantity surcharge)
**Estimated shipping charges: Germany: € 15-30 / EU: € 20-60 / RoW: € 60-120

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- For larger quantities, other materials, or custom designs please ask for a quote.
- Slight variations in the microstructures by +/- 3 – 4 μm may occur.

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