# Educational Microfluidic Starter Kit

## Product datasheet

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## Low Pressure Pump and Software

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<th>#</th>
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<tbody>
<tr>
<td>3200418</td>
<td>Fluika Low Pressure Pump</td>
<td>2</td>
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<tr>
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<td>Fluika Pressure Vessel: 100ml</td>
<td>2</td>
</tr>
<tr>
<td>N/A</td>
<td>Mitos Fluika Control Software (Included as standard with Fluika Low Pressure Pump)</td>
<td>1</td>
</tr>
<tr>
<td>N/A</td>
<td>USB 2.0 A-Male to Mini-B Cable (Included as standard with Fluika Low Pressure Pump)</td>
<td>2</td>
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</table>

## Fluika Starter Kit

<table>
<thead>
<tr>
<th>Part No.</th>
<th>Part Description</th>
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</thead>
<tbody>
<tr>
<td>3200300</td>
<td>FEP Tubing, 1/16&quot; x 0.1mm, 10 metres</td>
<td>1</td>
</tr>
<tr>
<td>3200063</td>
<td>FEP Tubing, 1/16&quot; x 0.25mm, 10 metres</td>
<td>1</td>
</tr>
<tr>
<td>3200064</td>
<td>FEP Tubing, 1/16&quot; x 0.5mm, 10 metres</td>
<td>1</td>
</tr>
<tr>
<td>3000056</td>
<td>FEP plugs 1.6mm</td>
<td>1</td>
</tr>
<tr>
<td>3200087</td>
<td>2-way In-line Valve</td>
<td>3</td>
</tr>
<tr>
<td>3000477</td>
<td>End Fittings and Ferrules for 1.6mm Tubing (pack of 10)</td>
<td>1</td>
</tr>
<tr>
<td>3000398</td>
<td>PTFE Tube Cutter</td>
<td>1</td>
</tr>
<tr>
<td>3000399</td>
<td>1/4 - 28 Straight Female Coupling, ECTFE</td>
<td>2</td>
</tr>
<tr>
<td>3200245</td>
<td>Ferrule with Integrated Filter (pack of 10)</td>
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</tr>
<tr>
<td>3000397</td>
<td>T-connector ETFE</td>
<td>1</td>
</tr>
<tr>
<td>3800193</td>
<td>Pneumatic Connector</td>
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## Optional Chips and Connectors

<table>
<thead>
<tr>
<th>Part No.</th>
<th>Part Description</th>
<th>#</th>
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<tbody>
<tr>
<td>3200241</td>
<td>2 Reagent Droplet Chip (100µm etch depth)</td>
<td>1</td>
</tr>
<tr>
<td>3200401</td>
<td>Micromixer Chip</td>
<td>1</td>
</tr>
<tr>
<td>3200008</td>
<td>Y-junction Chip</td>
<td>1</td>
</tr>
<tr>
<td>3000014</td>
<td>T-Junction Chip with header</td>
<td>1</td>
</tr>
<tr>
<td>3000158</td>
<td>Droplet Junction Chip (100µm etch depth)</td>
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</tr>
<tr>
<td>3000024</td>
<td>Linear Connector 4-way</td>
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</tr>
<tr>
<td>3000155</td>
<td>H Interface</td>
<td>1</td>
</tr>
<tr>
<td>3200232</td>
<td>PDMS Chip Interface</td>
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</tr>
</tbody>
</table>

## Optional Optical System

<table>
<thead>
<tr>
<th>Part No.</th>
<th>Part Description</th>
<th>#</th>
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<tbody>
<tr>
<td>3200293</td>
<td>Digital Microscope</td>
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</tr>
<tr>
<td>3200310</td>
<td>Microscope Stage Adaptor Kit for Edge Interfaces</td>
<td>1</td>
</tr>
</tbody>
</table>

## Optional Flow Sensors

<table>
<thead>
<tr>
<th>Part No.</th>
<th>Part Description</th>
<th>#</th>
</tr>
</thead>
<tbody>
<tr>
<td>3200095</td>
<td>Mitos Sensor Display (Optional)</td>
<td>3</td>
</tr>
<tr>
<td>3200244</td>
<td>Mitos Flow Rate Sensor, mixed pack of 3 (Optional)</td>
<td>1</td>
</tr>
</tbody>
</table>
The Educational Microfluidic Starter Kit is a low cost connect-and-go microfluidic system ideal for education or for those new to microfluidics. Create small droplets, learn about mixing of fluids, or observe microchannel flow - this simple system enables investigation of a wide range of microfluidic applications. The system is easy to set up and does not require gas supply. Power and control is supplied through a USB port.

The educational system gives users the flexibility to work with Dolomite supplied glass based chips, or with their own PDSM chips. If users are interested in working with Dolomite supplied chips, then with the H-interface and with the Multiflux connectors, users would select one or a few of the following chips.

The typical system is supplied with 3 chips as follows:

- **2 Reagent Droplet Chip** enabling generating small droplets in the size range of 20-150µm, containing 2 reagents
- **Micromixer Chip** for rapid mixing of two or three fluid streams in each of the independent mixing geometries
- **Y-junction chip** for applications such as Liquid-Liquid contacting or observation of microchannel flow

For those users interested in working with PDMS, Dolomite provides the following:

- **PDMS Chip Interface**: for fast and reliable connections to PSDM-on-glass devices

The PDMS chip interface works with Multiflux connectors and enables users to enjoy the benefits of quick release and re-assembly. The pressure based pumps utilize an internal compressor and pneumatic valves. They control the pressure in a glass bottle which acts as a fluid reservoir. These bottles are rated to work up to 1 bar. The fluid reservoirs can store up to 100ml of fluids. Each pump is able to pressurize multiple bottles, therefore pumping fluids in parallel.

The Mitos Fluika Low Pressure Pump is a very compact, low-cost pressure generator designed to provide pressurized air of up to 500mbar with fast and accurate control via a computer.
Benefits

Features and benefits:

- Ideal for studying and demonstrating a wide range of microfluidic applications
- Full infrastructure for a simple low cost microfluidic starter system
- Modular and flexible – only choose the parts that suit your application needs
- Tool free, robust and compact system
- Easy to use
- Excellent value
- No gas supply required
- Easy to interface with pneumatic quick-fit connectors
- Control via Mitos Fluika Control Software
- Pressures of up to 500mbar above atmospheric pressure
- Ability to pump multiple fluids from single pressure source

System Specifications

<table>
<thead>
<tr>
<th>Specification</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Droplet size range</td>
<td>45 – 180 µm</td>
</tr>
<tr>
<td>Droplet flow rates</td>
<td>70 n/min – 1 ml/min</td>
</tr>
<tr>
<td>Droplet frequency</td>
<td>Up to 500 Hz</td>
</tr>
<tr>
<td>Wetted materials</td>
<td>PEEK, Glass, FEP, FFKM, FKM</td>
</tr>
<tr>
<td>Weight and size</td>
<td>5 Kg</td>
</tr>
<tr>
<td>Voltage</td>
<td>220 V</td>
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</table>
Some suggested microfluidic chip geometries. These are available as Dolomite standard products. These may also be made from PDMS to be used with the PDMS interface.

Typical System setup

Example of a PDMS type chip, connector and interface usable with the above setup.

Example of a Dolomite standard chip, connector and interface usable with the above setup.

Part numbers: 3000014, 3000158, 3200241, 3200008
Mitos Fluika Low Pressure Pump (Part No. 3200418)

The Mitos Fluika Low Pressure Pump is a very compact, low-cost pressure generator designed to provide pressurized air of up to 500mbar above atmospheric pressure with fast and accurate control via a computer. The system is easy to set up and use with no gas supply required. Power and control is supplied through a USB port.

Combine with the Mitos Fluika Control Valve (Part No. 3200420) for fast and easy switching between pressures - ideal for microfluidic pressure-driven flow control, perfusion systems and flow cells, as well as miniature robotics and actuators and as a starter pump for education.

Features and benefits:

- Pressures of up to 500mbar above atmospheric pressure
- Miniature (10cm x 6cm x 3cm)
- No gas supply required, uses ambient gas
- Low-cost
- Easy to interface with pneumatic quick-fit connectors
- Fully USB controlled and powered. No extra power supplies or cables
- Fast and easy to control and program (.NET, LabView, MATLAB)

Mitos Fluika Pressure Vessel: 100ml (Part No. 3200427)

The Mitos Fluika Pressure Vessel is a 100ml sample bottle complete with filter and fittings ready for connection to a microfluidic pressure or vacuum supply to control the flow of the liquid sample. It connects via tubing to the Mitos Fluika Low Pressure Pump (Part No. 3200418), the Mitos Fluika Low Vacuum Generator Pump (Part No. 3200419) or the Mitos Fluika Control Valve (Part No. 3200420) Pressure driven flow is ideal for microfluidic systems where highly stable flow is required for applications such as droplet formation.
Fluid Tubes can be used to connect Dolomite’s Multiflux connectors to the Mitos P-Pump (Part No. 3200016), Mitos Syringe Pumps (Part No. 3200057 and 3200046), other Multiflux Connectors and Interfaces or modules that have a 1/4-28 thread using an end fitting and ferrule. The FEP tubes are translucent offering a better optical clarity and accuracy.

**Features and benefits:**

- FEP material
- Pipe length: 10m
- Internal diameter: 0.1mm
- Max. operating pressure: 276bar
- Operating temperature range: -50°C to 50°C
- Quick and easy to set up and connect
- Excellent chemical resistance

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Fluid Tubes can be used to connect Dolomite’s Multiflux connectors to the Mitos P-Pump (Part No. 3200016), Mitos Syringe Pumps (Part No. 3200057 and 3200046), other Multiflux Connectors and Interfaces or modules that have a 1/4 - 28 thread using an end fitting and ferrule. The FEP tubes are translucent offering a better optical clarity and accuracy.

**Features and benefits:**

- FEP material
- Pipe length: 10m
- Internal diameter: 0.25mm
- Max. operating pressure: 200bar
- Operating temperature range: -51°C to 50°C
- Quick and easy to set up and connect
- Excellent chemical resistance

**FEP Tubing, 1/16" x 0.5mm, 10 metres (3200064)**

Fluid Tubes can be used to connect Dolomite's Multiflux connectors to the Mitos P-Pump (Part No. 3200016), Mitos Syringe Pumps (Part No. 3200057 and 3200046), other Multiflux Connectors and Interfaces or modules that have a 1/4 - 28 thread using an end fitting and ferrule. The FEP tubes are translucent offering a better optical clarity and accuracy.

**Features and benefits:**

- FEP material
- Pipe length: 10m
- Internal diameter: 0.5mm
- Max. operating pressure: 130bar
- Operating temperature range: -51°C to 50°C
- Quick and easy to set up and connect
- Excellent chemical resistance

**Plug FEP (pack of 10) (3000056)**

The Plug FEP is used in conjunction with the Circular Connector (Part No. 3000051) and Linear Connector 4-way (Part No. 3000024). The Plug FEP enables users to block flow out of a port on a chip or connector. Available in a pack of 10.
2-way In-line Valve (3200087)

The 2-way In-line Valve provides an easy-to-use solution to quickly stop flow streams.

Features and benefits:

- Material: ETFE (similar to PTFE)
- Excellent chemical resistance
- Biocompatible, all polymer flow-path
- Low internal volume: 2.5µl
- Supplied with two fittings that connect to 1/16” OD tubing

End Fittings and Ferrules for 1.6mm Tubing (pack of 10) (3000477)

This pack contains various end fittings and ferrules which can be used to connect the Fluid Pipes (Part No. 3200063-68) to the Mitos Duo XS-Pump (Part No. 3200057) or other modules that have a 1/4” - 28” thread.

The pack contains the following end fittings and ferrules:

- 10 x Delrin end fittings with 1/4”-28” thread
- 10 x ETFE ferrules for 1/16inch pipe
- 1 x PTFE pipe cutter

PTFE Tube Cutter (3000398)

PTFE Tube Cutter for tubing of 2mm outside diameter and below. The double bevelled cutting blade produces clean 90° cuts on PTFE, FEP, PEEK and other polymer tubes.
1/4 - 28 Straight Female Coupling, ECTFE (3000399)

Female to female Tefzel connector with 1/4-28 threads. For making connections between compact and large head fittings.

Ferrule with Integrated Filter (pack of 10) (3200245)

This PCTFE Ferrule with integrated filter (stainless steel, 2µm pore size) is suitable for use with 1.6mm tubing and can also be used with the Compact Head Fittings (Part No. 3200059).

T-connector ETFE (3000397)

T-Connector ETFE 0.5mm I.D. for 1.6mm O.D. Pipe.

Micromixer Chip (3200401)
The Micromixer Chip is a lamination-based compact glass microfluidic device that allows rapid mixing of two or three fluid streams in each of the two independent mixing geometries. The chip can be used for the study of reaction kinetics, sample dilution, improved reaction selectivity, rapid crystallisation and nanoparticle synthesis. It is compatible with the Dolomite’s easy to use H Interface (Part No. 3000155), Linear Connectors 4-way (Part No. 3000024; two of which are typically needed) and the Hotplate Adaptor (Part No. 3200111).

Features and benefits:

- Extremely rapid mixing across a range of flow rates
- Low dead volume
- High visibility - excellent access for optics
- Quick and easy to connect/disconnect
- Wide temperature and pressure range
- Excellent chemical compatibility
- 2 x (3 inputs and 1 output)

Y-junction chip (3200008)

The Y-Junction Chip is a glass microfluidic device designed for a range of applications including liquid-liquid contacting and observation of microchannel flow. The Y-Junction Chip is designed to fit into the Chip Interface H (Part No. 3000155) with two Linear Connectors 4-way (Part No. 3000024).

Features and benefits:

- Extremely smooth channel surface
- Wide temperature and pressure range
- Excellent chemical compatibility
- Quick and easy to connect/disconnect
- High visibility - excellent access for optics
- Compact design
- 4 inputs and 4 outputs

T-Junction Chip with header (3000014)
The T-Junction Chip is a glass microfluidic device designed for a range of applications including mixing fluids, microreactions and droplet formation. The chip is supplied with a chip header that allows connection to the Linear Connector 4-way (Part No. 3000024).

Features and benefits:

- Low dead volume
- Quick and easy to connect/disconnect
- High visibility - excellent access for optics
- Extremely smooth channel surface
- Wide temperature and pressure range
- Excellent chemical compatibility
- 2 inputs and 1 output
- Supplied with a Chip Header
- Requires a Linear Connector 4-way (Part No. 3000024)

Droplet Junction Chip (100µm etch depth) (3000158)

The Droplet Junction Chip is a glass microfluidic device designed for generating droplets. The Droplet Junction Chip offers both a T- and X-Junction. Applications include monodispersed droplet formation and emulsion formation.

Features and benefits:

- Easy to use
- Extremely high droplet production rate of up to 12,000 droplets per second
- Extremely consistent droplet size
- Straight-through path for droplets
- Excellent visibility
- Hydrophilic coating; also available with hydrophobic coating
- Excellent chemical compatibility
- Wide temperature and pressure range
- Compatible with Chip Interface H (Part No. 3000155) for fluidic connection

- Operating pressure: 30bar
The 2 Reagent Droplet Chip is a glass microfluidic device designed for generating droplets containing 2 reagents. Designed for a wide range of applications including high throughput chemistry, biomedical analysis of cells, janus particle formation and polymerization research.

Features and benefits:

- Rapid generation of droplets containing 2 reagents
- Ideal for carrying out reactions inside droplets
- Generation of small droplets in the 20-150µm size range
- Etch depth: 100µm
- Hydrophilic coating; also available with hydrophobic coating
- High visibility (excellent access for optics)
- Straight through flow path for improved droplet collection
- Excellent chemical compatibility
- Compatible with Dolomite connectors for quick and reliable fluidic connection
- Operating pressure: up to 30bar

The Linear Connector 4-way allows fast, reliable and efficient connection between Dolomite chips and 1.6mm O.D. tubing. The Linear Connector works with chips that are 4mm thick, 15mm wide and also have a chip header in place. It can be used together with the Linear Connector Seal (Part No. 3000021).

Features and benefits:

- Number of ports: 4
- Small footprint
- Operating pressure: 30bar
- Operating temperature range of seal: -15°C to 150°C

Quick and easy to connect/disconnect
- Low dead volume
- Wetted material: glass, PTFE and perfluoroelastomer
- Excellent chemical compatibility

**H-Interface (3000155)**

The H Interface works in conjunction with two Linear Connectors 4-way (Part No. 3000024), providing fluidic connections to glass microfluidic chips.

**Features and benefits:**

- Flexible solution - compatible with chips of dimensions 22.5 x 15.0 x 4.0mm
- Enables fast and reliable connections between Dolomite chips and 1.6mm tubing
- Small footprint
- High chemical resistance
- Variable I.D./O.D. pipe connection
- Low dead volume
- Wide temperature and pressure range

**PDMS Chip Interface (3200232)**

The PDMS Chip Interface provides a flexible and fast solution for PDMS chip connections. The PDMS Chip Interface is easy to use and no technical experience is needed to connect and disconnect. To be used with the PDMS Chip Slide 50x25mm (Part No. 3200264) or PDMS Chip Slide 75x25mm (Part No. 3200275), the PDMS Chip Interface provides a robust solution for the chip to be used outside the lab which widens applications for PDMS chips beyond research and the opportunity for greater collaboration between research labs. The PDMS Chip Interface can be also found as part of the PDMS Chip Interface Starter Kit (Part No. 3200273)
Features and benefits:

- Quick to connect and disconnect
- Reliable sealing
- High density of connections
- Good microscope access
- Accommodates wide range of PDMS device heights
- Thin layer glass slide option
- Extended chip lifetimes
- No requirement to punch holes in PDMS for fluid access

Digital Microscope (3200293)

The Digital Microscope is a compact solution for capturing high quality still and video images. The innovative design replaces the traditional eyepiece with an LCD screen for easy and comfortable viewing of microfluidic experiments.

Easy to use, this microscope provides high powers from 40x up to 400x (up to 1600x with digital zoom). It is also ideally suited for tailored adjust the illumination to maximize the image quality of the microfluidic chips.

The microscope is supplied with 4x, 10x and 40x objective lens, LCD Monitor, top and bottom illuminators, USB cable and SD Card Slot, AC Adapter, Dust Cover and Carrying Case as well as Digital Camera and Filter Wheel- built in.

Features and benefits:

- LCD display with 4x Digital Zoom for easy and comfortable viewing of your microfluidic experiments without any need of PC connections
- High quality image with a built-in digital camera (2MP)
- Top and bottom LED illumination
- Easily connected to a PC using USB cable
- Easy portable and compact designed
Microscope Stage Adaptor Kit for Edge Interfaces (3200310)

The Microscope Stage Adaptor Kit Edge for Interfaces allows Dolomite’s Multiflux Edge Interfaces and connectors to be secured in the X-Y direction on microscope stages for easy viewing of microfluidic experiments. The kit is compatible with Dolomite’s Digital Microscope (Part No. 3200293) and a wide range of microscope slide holders which work with a slide size of 75mm x 25mm. Made of stainless steel, the adaptors have excellent chemical resistance.

**Kit contains:**

- 1 x adaptor for Multiflux’1 and Multiflux’2 H Interface (Part No. 3000155, 3200297)
- 1 x adaptor for Multiflux’1 T’Junction Chips with Header
- 1 x adaptor for future Multiflux’2 Edge Interfaces

IP License

Dolomite is a licensee of Japan Science and Technology Agency (“JST”) under JST’s microdroplet generation technology.

This enables our customers to purchase and use our droplet chips for R&D purposes without any restriction from this comprehensive IP family.

Contact us for more information about licensing this IP for your custom application or chip design.