

# microComponents<sup>m</sup>

You are interested in the world's smallest micropumps with piezo actuators?

Find out how to get the optimal components. Start with system integration in just a few steps.

This document provides first information about pumps and different control modules. It also gives a short overview of controller specifications.

The mp6 micropump series is designed for the controlled handling of fluids and gases with variable flow rates. They require a non-symmetric signal which is exactly matched with the operation of the pump. To cover a large range of possible applications we developed several control units.

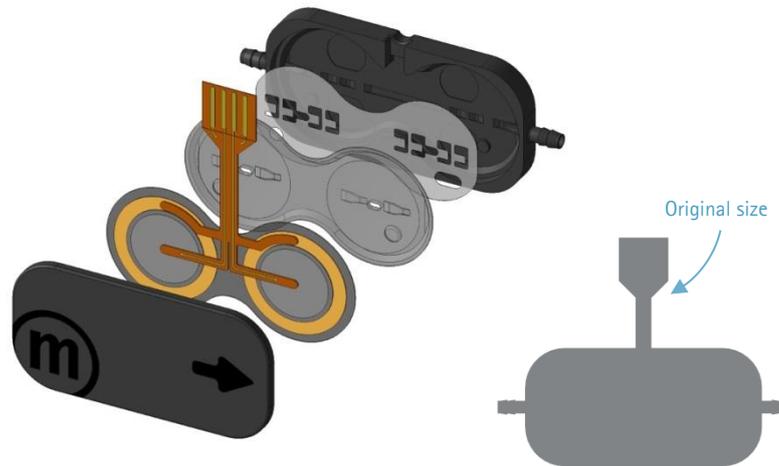
In case a component does not match your requirements please contact us so we can work together to a solution. Our competent team has a lot of experience in development and production to push your ideas to new levels.



## The micropumps mp6-liq/ mp6-gas / mp6-pi / mp6-pp:

The pumps are miniaturized versions of double diaphragm pumps. Each pump has two piezo actuators. Because of the small size and energy saving construction the production of high numbers is very cost-efficient.

Due to the production material and the variable flow rates the pumps are usable in many applications. The **mp6-liq** is a good choice for pumping liquids and gases, while the **mp6-gas** excels when being used for gases. The **mp6-pp** and the **mp6-pi** offer more liquid media compatibility.

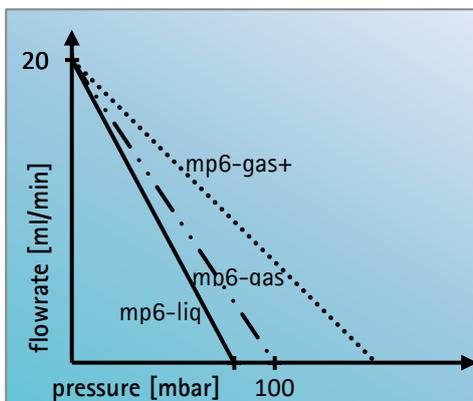


2 mp6, Exploded view

1 Dimensions in xyz = 30 mm x 15 mm x 3.8 mm  
(1.1811" x 0.5906" x 0.1496")

For all of the pumps the following rule applies:

*"The flow rates of the pumps are linearly dependent on the backpressure. At 0 mbar backpressure they achieve the maximum flow rate, at maximum backpressure the flow rate decreases to 0 ml/min."*



3 Flow rate vs. pressure of the mp6-liq, mp6-gas+ and mp6-gas

The micropumps are offered as single units or together with evaluation sets. With the sets you are able to gather specific knowledge about the combination of our micropumps with your application and to reduce time and costs for a possible integration task. Together with the different control electronics you have a powerful platform to choose from.



## The mp-Labtronix controller:

Driving the micropump with the **mp-Labtronix** allows you to gather comprehensive results in short time. You will also be able to consider the sometimes complex interaction of micro- and macrofluidics with direct measurements of your system right from the beginning. Furthermore you will also be able to conclude about how to integrate the micropump into any of your systems.



4 mp-Labtronix

Dimensions in xyz = 157 mm x 200 mm x 75 mm (6.1811" x 7.8740" x 2.9527")

For that purpose, you can connect the **mp-Labtronix** via USB-port with a PC, manually control it with the NI-LabView interface and turn it into a fully automatized control. Experiments with systems in which pressure-, flow- or other – sensors gather additional data are easily achievable. You can start with basic LabView routines that we implemented already for you.

Independent of the NI-LabView develop environment you can choose every other computer language that can handle the communication with an emulated serial interface.

One big advantage of the **mp-Labtronix** controller is the possibility to set the whole range and combinations of all parameters:

Frequency: 1 – 300 Hz

Amplitude: 1 – 250 Vpp; asymmetric

Wave-forms: sine, rectangular, SRS (a compromise between performance and low noise)



## The mp-Lowdriver controller:

This controller IC is designed for the integration of the pump into a small space. The compact design allows a broad variety of application fields. Due to the optimized energy consumption, it is possible to create unplugged systems. Battery operation allows mobile applications. As the prefix adumbrates, the **mp-Lowdriver** addresses low flow rates in the  $\mu\text{l}$  range.



5 mp-Lowdriver

Dimensions in xyz = 10.16 x 25.40 x 2.64 mm (0.40 x 1.00 x 0.10 in.) excluding socket pins

Please note that the **mp-Lowdriver** is not equipped with the same performance range of the mp-Labtronix.

The setting range of the parameter is limited:

Frequency: 8 – 2000 Hz

Amplitude: 0 – 150 Vpp; asymmetric

Wave-forms: sine, custom



## The mp-Highdriver controller:

This controller IC is designed for the integration of the pump into a small space. The compact design allows a broad variety of application fields. Due to the optimized energy consumption it is possible to create unplugged systems. Battery operation allows mobile applications. As the prefix adumbrates, the **mp-Highdriver** addresses higher flow rates in the low ml range.



6 mp-Highdriver

Dimensions in xyz = 10.16 x 25.40 x 2.82 mm (0.40 x 1.00 x 0.11 in.) excluding socket pins

Please note that the **mp-Highdriver** is not equipped with the same performance range of the **mp-Labtronix**.

The setting range of the parameter is limited:

Frequency: 50 – 800 Hz

Amplitude: 10 – 250 V<sub>pp</sub>; asymmetric

Wave-forms: sine, rectangular, trapezoid



## The mp-Highdriver4 controller:

An alternative to the **mp-Highdriver** or **mp-Lowdriver** is the **mp-Highdriver4**. This controller IC is designed for the integration of the pump into a small space. The compact design allows a broad variety of application fields. Due to the optimized energy consumption it is possible to create unplugged systems. Battery operation allows mobile applications. As the prefix adumbrates, the **mp-Highdriver** addresses higher flow rates in the low ml range. In contrast to the **mp-Highdriver** the **mp-Highdriver4** allows to control up to four micropumps simultaneously.



7 mp-Highdriver4

Dimensions in xyz = 38,1 x 17,78 x 11,6 mm (1.50 x 0.70 x 0.46 in.) excluding socket pins

The **mp-Highdriver4** comes in a package similar to an integrated circuit that enables integration into system electronics or on a PCB. The driving frequency, amplitude and also the driving signal is adjustable. Sine signal and rectangle are available amongst others. Every pump can be activated and deactivated individually. This driver is configured and controlled through an I<sup>2</sup>C interface.

The setting range of the parameter is limited:

Frequency: 50 – 800 Hz

Amplitude: 10 – 250 Vpp; asymmetric

Wave-forms: sine, rectangular, trapezoid



## The mp-Multiboard evaluation board:

The **mp-Multiboard** is an evaluation board that allows controlling all our driver chips as **mp-Highdriver**, **mp-Lowdriver** and **mp-Highdriver4** from a computer through USB. Onboard the mp-Multiboard an Arduino microcontroller acts as an interface for the I<sup>2</sup>C bus. The "Multiboard App" on the computer communicates with the microcontroller through a custom protocol facilitating setup and control of all our driver chips on one platform.



8 mp-Multiboard

Dimensions in xyz = 100 x 50 x 17 mm (3.94 x 1.97 x 0.67 in.) not including baseplate

Up to four micropumps can be connected to the board via cable harness. An external power supply terminal is available, but the board can also be powered through the microcontroller USB port. The board has multiple auxiliary connectors for future use with active valves, pressure and flow sensors. The mp-Multiboard comes preprogrammed with an interface software and windows application. Arduino source-code is available on our website. Interface protocol will be available soon.



A demonstration video of the evaluation kit **mp-Lab!** along with further information about our products can be seen on our „bartels-mikrotechnik“ homepage.

[www.bartels-mikrotechnik.de](http://www.bartels-mikrotechnik.de)

Although you have some possibilities to evaluate the application of the micropump with our controller solutions, it is impossible to cover all applications and media types. These will definitely induce different performance conditions to the pump. Therefore it is imaginable that some of these conditions will make it hard to achieve the desired pump performance in the evaluation process.

However, this does not mean that your application is not accomplishable. The simple functional principle of the piezo membrane pump and the controller allows adapting to your requirements. If you need a higher flow or pressure generation, a higher flow precision or other materials, we would be happy to discuss your application and adapt the micropump to your specific needs.

Please look over the information and feel free to contact us to discuss your questions on the pump or on the evaluation kits.

All values are approximate and no guarantee of specific technical properties.

Changes in the course of technical progress are possible without notice.



**Contact Data:**

Bartels Mikrotechnik GmbH  
Konrad-Adenauer-Allee 11  
44263 Dortmund Germany  
[www.bartels-mikrotechnik.de](http://www.bartels-mikrotechnik.de)  
[info@bartels-mikrotechnik.de](mailto:info@bartels-mikrotechnik.de)  
Tel: +49-231-47730-500  
Fax: +49-231-47730-501

**Visit our Website**

[www.bartels-mikrotechnik.de](http://www.bartels-mikrotechnik.de)

**for further information on applications.**

**Tutorials and helpful answers to frequently asked questions can be found in our FAQ**

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