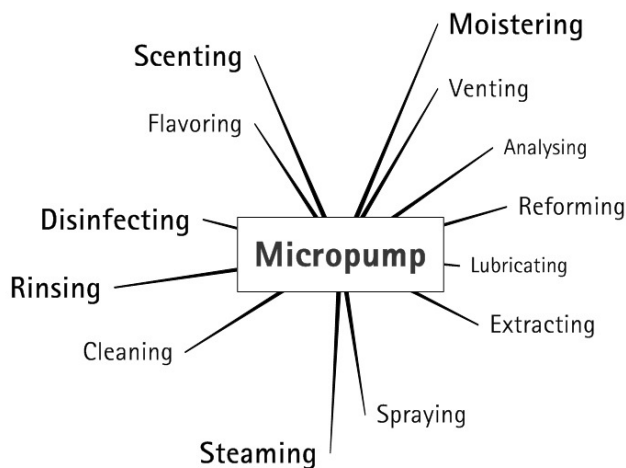


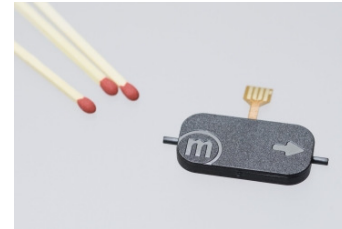
## Micropumps in Small Appliances and Consumer Products

*By implementing miniaturized components the function of consumer products can be improved providing additional benefits to the user. In the course of this trend also the transport of liquids and gases plays an increasing role. Here micropumps like the small piezo membrane pump mp6 produced by Bartels Mikrotechnik come into play.*

Pumping applications in small appliances are manifold as shown in the diagram below. Examples can be found in providing additives as scents or flavors. To improve hygiene, cleaning agents or disinfectants can be applied. Also on demand generation of steam can be implemented. For monitoring purpose pumps can transport gas or liquid samples to a sensor. For example this can be used to control the cooking status in food preparation or for other additional safety features.



Due to their small dimensions and attractive price level, micro pumps as the mp6 are well equipped for this task. Taking benefit of the small size of the mp6 of 30 x 15 x 3,8 mm<sup>3</sup>, both pump and reservoir can be assembled on a small footprint. Combined with



Micropump mp6



Micropump mp6 with reservoir bag



driving electronics and controls, compact building blocks can be designed. The benefit lies in increased functionality for the end user in different application areas.

With flow rates of up to 6 ml/min with liquids and about 18 ml/min for gases and maximum backpressures of 550 mbar or 100 mbar respectively, the micropumps can address a number of different requirements.

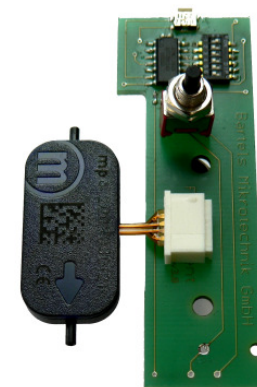
While in most appliances powering through line voltage is required, due to low power consumption of the micropump battery driven solutions are possible. For both requirements, reference electronics are available that can be customized according to the customers needs.

A popular example of an on-grid appliance without low voltage circuitry is the steam iron. Normally heater temperature and steam generation can be adjusted separately. To deliver scents besides the standard water steam, products like pre-scented water are available, but as these need to be refilled very regularly due to low concentration, this requires a lot of effort from user side. A solution is found in adding an extra reservoir to the main water tank of the device. Dependent on the product concept, either on demand dosing of scent fluid to the needle valve or scenting of the complete main tank volume can be realized. By establishing a cartridge system, the device manufacturer can ensure that only certified fluids are used in the system in order to assure full product lifetime.

The pump can be placed either in the device handle or next to the reservoir. The picture on the right shows the pump together with a driver module inside a steam iron handle. The control switch is in direct vicinity of the user, so all functional elements are combined in a single unit. The pump medium is transported from the cartridge on the back side to either needle valve or main fluid tank. Due to



Steam iron including a pump module



Pump with driver module



the low dosage volumes in the range of 0,3 ml per actuation, at a given concentration of the scent fluid more than 100 cycles per cartridge are possible without a significant size increase of the device.

Due to the automated serial production of the micropump mp6, the component is available at an attractive price level in mid and large quantities. The robust and simple setup and having only a single material in fluid contact eases the use in mass market products. In addition the polymer PPSU is generally certified for use with drinking water and food products. Besides standard products, Bartels Mikrotechnik also offers the development of customized pumps and fluidic systems.

### About Bartels Mikrotechnik

Ever since its foundation in 1996 Bartels Mikrotechnik GmbH has been a synonym for great innovative power and microtechnological know-how.

Bartels specializes in innovative applications of micro systems technology (MST) in the branches of classical consumer goods, mechanical engineering and medical technology. Microfluidics, microactuation and micromechanics constitute the company's technological focus. The international activities of Bartels Mikrotechnik subdivide into two business segments: Bartels microEngineering and Bartels microComponents.

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