

Application Note

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 the transport of liquids and gases plays an increasing role. 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.

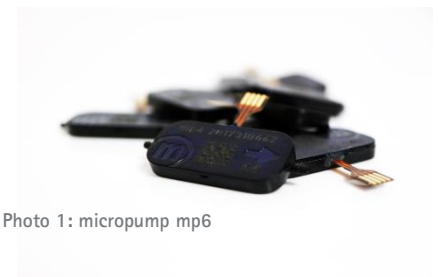
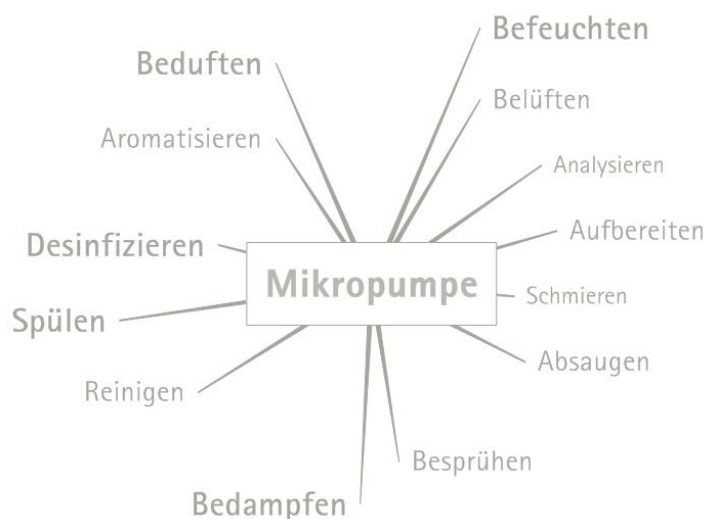


Photo 1: micropump mp6



Due to their small dimensions and attractive price level, micro pumps are well equipped for this task. Taking benefit of the small size of the micropump mp6 of $30 \times 15 \times 3,8 \text{ mm}^3$, both pump and reservoir can be assembled on a small footprint. Combined with 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



Photo 2: mp6 with reservoir bag



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 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.

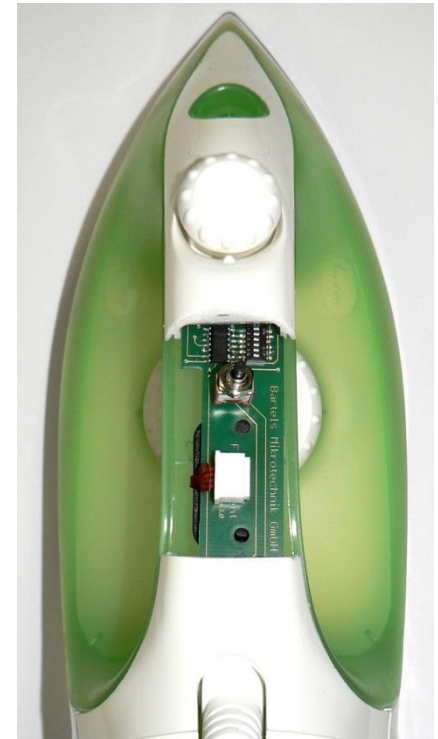
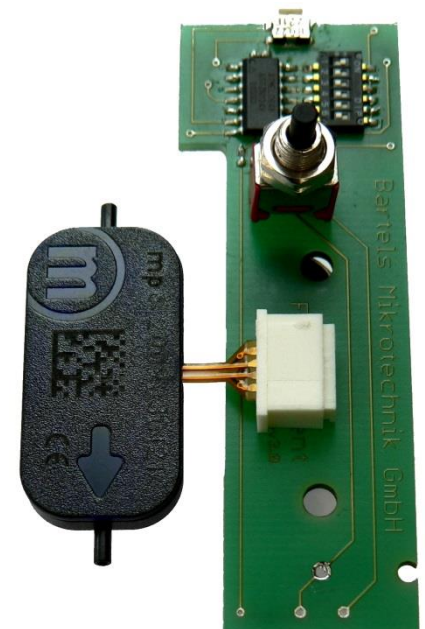


Photo 3: Steam iron including a pump module



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Videotutorials and other answers can be found on our Blog

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