

Dispensing with higher precision

New low cost inductive position sensor

A simple, low-budget position sensor opens up new possibilities in pumping- and dispensing-technologies. A novel approach for high precision, microcontroller regulated dispensing pumps for applications in medical- and biotechnologies was developed at Hahn-Schickard.

A novel, regulated dosing pump was set up. It allows for flow rates ranging from 1 ml/h up to 2000 ml/h while offering a precision in the flow rate of $\pm 2\%$ and better with low pulsation. The pumping unit of the dispenser was designed as a disposable part and is based on the piston-pump principle patented by Hahn-Schickard.

The actuation unit based on the reluctance principle is a toroidal transformer with ferromagnetic core. If a current is applied to its coil a force on the piston is generated without any parts being moved except for the piston. The actuation unit is very robust and can be manufactured at costs of less than 4.00 EUR.

The outstanding component of the dosing pump is its contactless sensor with a novel signal processing circuitry which is used for detecting the position of the piston inside the disposable.

The sensor is capable of a spatial resolution of 5 μm or better and provides the input value for

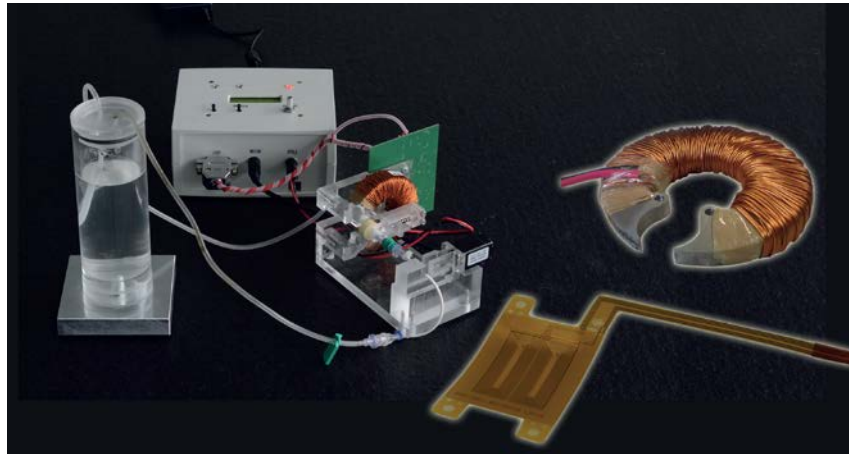


Fig. 1: Pump system (left) with actuation unit and position sensor (right)

Sensor Features

- Disposable pump element
- Disposable dosing valve
- High accuracy flow rate
- High dynamic flow control
- Low cost position sensor

a close-loop controlled flow regulator. For this purpose, a novel low-budget inductive position sensor is used that is based on the LVDT-principle. The sensor is composed of a thin flexible printable circuit board that can be manufactured for less than 0.20 EUR.

It permanently remains within the actuation unit with its metal core and its magnetic field. With the novel signal processing circuitry it offers an unaffected characteristic curve and a large dynamic range. Because of the fast sam-

Field of application

- Infusion pump
- Laboratory pumps
- Replacement of syringe and peristaltic pumps

pling rate of several kHz without any ADC even fast piston movements can be detected by the sensor which allows for a fast regulation.

However, the simple and flexibly designed sensor approach is not only suitable for linear position detection in disposable pump systems with a metallic piston. In principle, it can also be adapted to any other application which requires a contactless detection of the linear movement of a metallic body.