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# Electrostatically Driven 3-Way Silicon Microvalve for Pneumatic Applications

Stephan Messner[1,*], Jochen Schaible[2], Peter Nommensen[1], Roland Zengerle[1,3]

[1] HSG-IMIT, Wilhelm-Schickard-Str. 10, D-78052 Villingen-Schwenningen, Germany
[2] Hoerbiger Automatisierungstechnik GmbH, Südliche Römerstrasse 15, D-86972 Altenstadt, Germany
[3] IMTEK, University of Freiburg, Georges-Köhler-Allee 103, D-79110 Freiburg, Germany

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In many industrial applications there is a need for microvalves meeting requirements like small form factor, low weight, high flow rate, short response time and low power consumption. Especially for pneumatic applications, there is a need for microvalves with a normally-closed, 3-way functionality. In this paper, we present a microvalve which meets the requirement described above and which is used in a gas chromatography application due its small dead volume. At the moment, it is used in a space flight mission because of its resistance against mechanical vibration and variation in temperature. The microvalve is fabricated by silicon micromachining including a three layer full wafer bond process. The silicon chip stack is mounted onto a ceramic substrate which is covered by a plastic cap. To control the valve a low power driver electronics chip, able to convert TTL levels to the actuation voltage of 200 V is assembled directly on top of the microvalve. Due to the electrostatic actuation principle and the low power electronics, the peak power consumption of the valve is below 10 mW and the response time is less than 1 ms. The flow rate of the microvalve is in the range of 500 sccm and the presented version is designed to operate in a pressure range of up to 8 bar.

*Corresponding author, e-mail address: stephan.messner@hsg-imit.de