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Vortragssprache: EN



SMA flat form actuators and their application

The memetis GmbH develops and produces components and systems based on its proprietary shape memory alloy (SMA) actuators, which are generally used in the Life Sciences or in Space. The SMA actuators consist of foils or films with a thickness between 10-100 μm , which are structured 2-dimensionally using additive or subtractive manufacturing technologies. During this structuring process, the required forces and stroke are adapted to the desired applications. In addition to the advantages of a high working density, a simple current control, a noiseless switching behaviour and a robust system, SMA flat form actuators offer the additional advantages of simplified mechanical integration, great design freedom, and reduced installation space. One of memetis' core products are microvalves that are available normally open, normally closed, or bistable. The two monostable valves can be used as proportional valves by means of a flow sensor or measurement of the electrical resistance, and integration into a control system. The valves are used in the field of automated analyses where space requirements and the amount of reagents are limited. For these areas, the company's portfolio also includes chip actuators that block or unblock fluidic channels in cartridges by extending or retracting a plunger. For space applications, customised actuation systems are offered that enable a low overall weight and are also available in bistable design to save electrical energy. Besides the realisable forces and strokes, the load-dependent fatigue behaviour of SMA flat form actuators is presented. Furthermore, the various possibilities of mechanical and electrical contacting as well as electrical control are explained.