

Lateral-stator machine (LSM) is an unconventional permanent-magnet electrical machine type that enables direct drive for micromachining applications where the space in the tool head is limited. In such applications, standard position sensors cannot be used due to the space limits. The back electro-motive force (EMF) cannot be used for position estimation as the rotor position is needed over the full-speed range, including very low speeds. Moreover, the load-dependent saturation of the stator core hinders an impedance-tracking-based self-sensing approach. Therefore, this paper presents integrated position sensors comprising sensing coils wound on the shielding iron, which is a part specific to the mentioned type of machine. Using this approach, the challenge introduced by the specific machine geometry is turned into an opportunity to realize highly compact and robust position sensors that can operate from standstill up to 200 000 r/min. Measurement results prove the validity of the design procedure. Even though developed for a specific type of electric machine, the presented approach can be used for position sensing of other types of electromechanical actuators