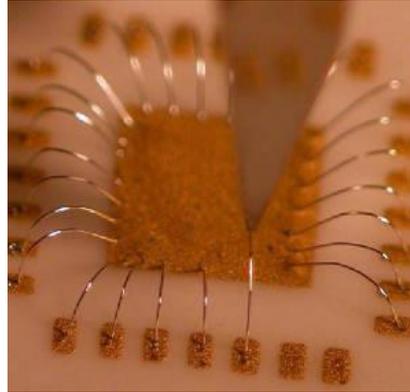


A novel limited stroke actuator design was developed to enable a new generation high accuracy stages. The moving magnet principle was implemented to reduce the disturbance effects of power cables on the moving part and to improve the thermal path of the stator part. The lightweight moving part is directly propelled in the centre of gravity, which strongly reduces all kind of dynamic disturbance forces and torques felt in high precision stage. Low K-factor ripple and attraction force ripple enables high dynamic control performance.

The optimized permanent magnet array and coil assy yields a high steepness, meaning it causes little dissipation in the coils for high forces. The magnetic design is free of cogging forces and facilitates very little end-effects enabling a functional stroke of 50 mm in X- and Y-direction. The static part is easily connected to a force frame or can function as a balance mass to reduce overall machine disturbance forces. The static coil part can be cooled with forced air cooling, water cooling or heat pipe technology depending of the needed force density. In combination with a suitable amplifier, high peak forces can be generated during servo control.



#### Application areas:

- XY stage (requires 2 actuators)
- Wire bonding
- Linear servo motor

#### Key features:

- High force density
- No moving wires, high reliability and lifetime
- Maintenance free
- Propulsion force directly in centre of gravity
- No cogging and quiet operation
- Easy to interface and to integrate forced cooling

Technical Data		
Model MI 1144 001		
Parameter [unit]	Value	Note
L x B x H [mm]	230 x 135 x 47	Static coil part
Stroke in force direction [mm]	50	
Stroke perpendicular to the force direction [mm]	50	
Force constant [N/Apk]	18.1	At 21°C
K-factor ripple @ peak force [N]	<2.5%	
F <sub>rms</sub> with S1, TDC = 100% [N]	220	T <sub>coils</sub> = 120°C @ P <sub>dis_rms</sub> = 555 W
F <sub>rms</sub> with S6, TDC = 40% [N]	340	T <sub>coils</sub> = 120°C @ P <sub>dis_rms</sub> = 555 W
Steepness [N <sup>2</sup> /W]	99	At 21°C
Vertical stiffness [N/mm]	210	
Mechanical air gap [mm]	0.7	
R <sub>th</sub> (no additional cooling) [K/W]	0.3	
R <sub>th</sub> (forced air cooling) [K/W]	0.18	Simple 12V fan
Phase resistance [Ω]	1.77	At 21°C
Phase inductance [mH]	1.72	At all positions