Stefan Mayer Instruments

Wallstr. 7
D-46535 Dinslaken, Germany
Phone/Fax: +49 2064 479762/3
http://www.stefan-mayer.com
Email: mail@stefan-mayer.com

Magnetic Field Compensation System *FAST* MR-3

Three axis automatic compensation of magnetic field disturbances from DC to 10 kHz

Features

- Continuous real time compensation of magnetic field disturbances from DC to ∼10 kHz
- Typical 50 dB attenuation from DC to 200 Hz, 13 dB @ 9 kHz
- Magnetic field measurement with high resolution sensors
- Rugged analog design, no tedious programming
- Integrated power amplifiers for direct connection of compensation coils
- Field monitor and alarm functions

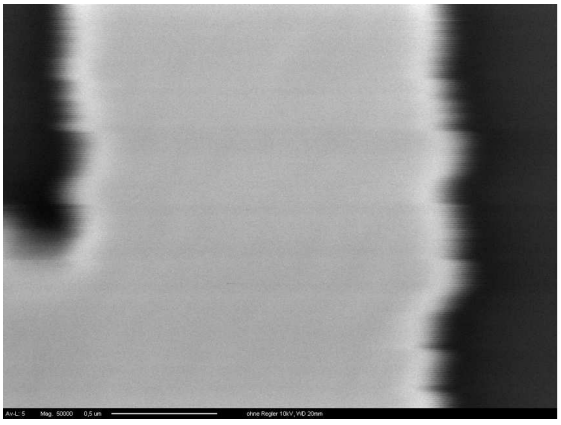
Applications

- Improvement of electron microscope images (SEM and TEM)
- Biomagnetic and paleomagnetic applications
- Compensation of power line frequencies (50/60 Hz) and harmonics
- Attenuation of slow or stepped magnetic field changes caused by vehicles, moved magnetic objects, elevators, etc.
- Attenuation of 9 kHz magnetic field from robotic wafer transports

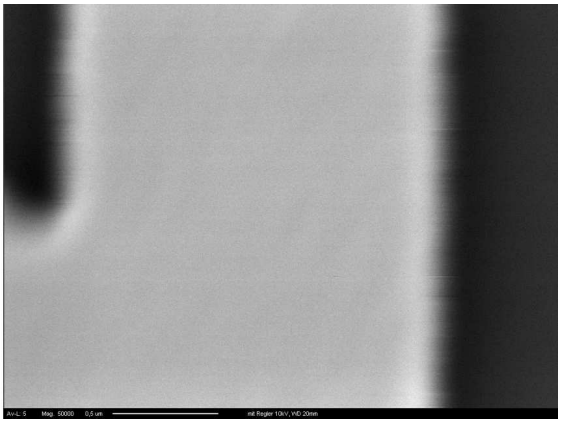
Description

The magnetic field compensation system *FAST* MR-3 is a new version of our proven MR-3 system. Typical applications are noise reduction in electron microscopy, electron and ion beam experiments, magnetic resonance imaging (MRI), biomagnetic investigations, SQUID operation, and paleomagnetic research. **The frequency range has been increased to 10 kHz to cancel high frequency noise from robotic wafer transport in modern semiconductor wafer fabs.**

The *FAST* MR-3 is a feedback compensation system. The magnetic field noise is reduced by establishing a compensating magnetic field in opposite direction. The *FAST* MR-3 continuously compensates magnetic field disturbances in the frequency range from DC to ∼10 kHz. The magnetic field is measured with a low noise triaxial fluxgate magnetometer combined with a triaxial induction coil sensor. Analog control electronics generate compensation signals which are fed to the built-in power amplifiers for direct connection of compensation coils. Typically, such coils simply consist of a set of cable rings with a low number of wires installed in the edges of the laboratory.



***FAST* MR-3 off**



***FAST* MR-3 on**

SEM image improvement

Specifications

Magnetic field sensor	triaxial fluxgate sensor and triaxial induction coil sensor
Zero drift	< 0.1 nT/K
Noise	< 1 nT RMS (0.1 Hz $<$ f $<$ 10 kHz)
Dynamic compensation range	$> 6\ \mu T_{PP}$ (60 mG_{PP})
Analog outputs	1 V/μT, BNC connectors for X, Y, Z
Bandwidth	0 to 10 kHz (-3 dB)
Digital displays	show incremental DC or true rms AC magnetic field for X, Y, and Z
Resolution	1 nT
Measurement accuracy	$\pm 1\%$
Analog meters	show coil current, range ± 3 A
Attenuation DC to 200 Hz	typ. 50 dB at sensor position
Attenuation @ 9 kHz	typ. 13 dB at sensor position

Subject to alterations.