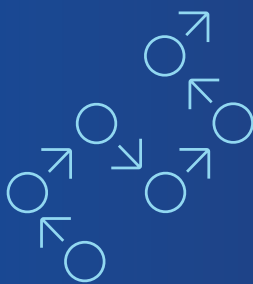


# SEKELS MAG $\mu$ MAN

## Permanent magnetic tool for contactless guiding of magnetic particles

Nanoparticles gain more and more importance in biological and pharmaceutical research. In many fields, the controlled contactless motion of ferromagnetic nanoparticles is of great importance. Examples are cell manipulation, cell sorting, magnetic drug targeting (MDT), hyperthermia and motion of suspended cells doped with nanoparticles. Due to the dynamic evolution of this field of research, this enumeration can only be regarded as an extraction.

### What you can do with SEKELS MAG $\mu$ MAN



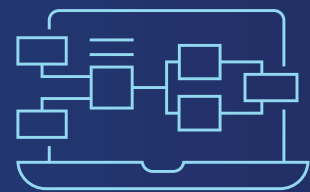
#### Move

suspended iron oxide nanoparticles (SPIONs) along arbitrary trajectories



#### Observe

nanoparticles under most commercially available microscopes



#### Program

particle movements with supplied software

### Features



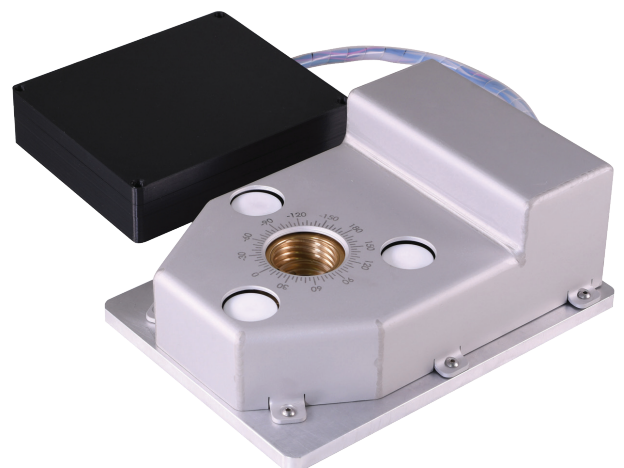
permanent magnet based



intended for experiments in a Petri dish (ibidi Glass Bottom Dish 35 mm e. g.)



for veterinary or even human medicine applications



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# Principle of SEKELS MAG $\mu$ MAN

The system consists of several different annular magnetic subsystems which are based on the so-called Halbach principle. It employs as well Halbach-dipole as -quadrupole arrangements which generate superimposed magnetic fields and field gradients.

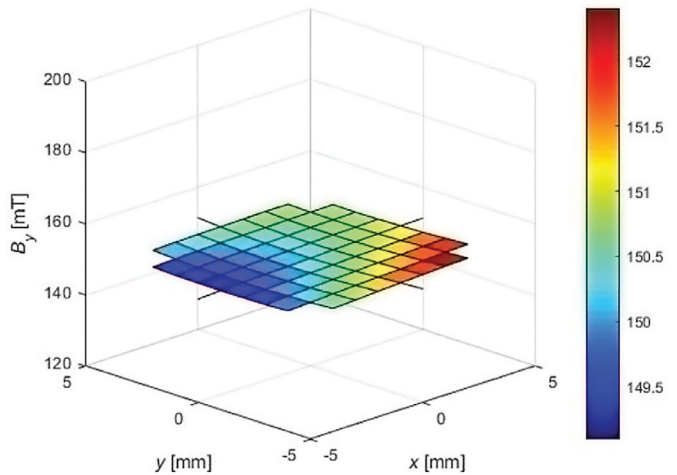
The homogeneous field of the dipole causes reversible agglomeration of superparamagnetic particles which increases their speed compared to single particles moved by the same gradient field.

The required magnetic field gradients are tunable in amplitude and direction by turning different quadrupole subsystems in the unit around the vertical axis. These rotations are software assisted to enable an easy adjustment of the aspired gradient configurations and thereby reproducible manipulation sequences.

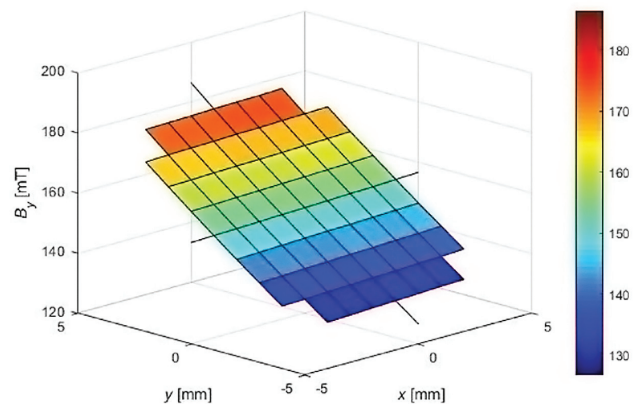
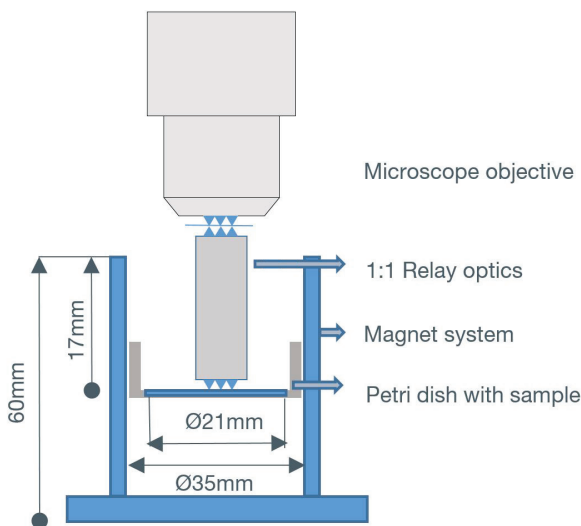
The process can be observed by means of a 1:1 relay optics ( $\varnothing$  16 mm) which enables adjustment of different magnifications on the employed (reflecting) microscope without the objectives to be immersed in the magnet system. The objectives can be freely adjusted on the revolver.

The screen image circle is  $\varnothing$  0.6 mm and the operating distance 0.4 mm. The image is corrected for a wavelength range of 460...700 nm and diffraction limited.

Optionally we offer a 1:1 relay optics which can be immersed in liquids.



**Homogeneous magnetic field generated by the dipole magnet ring at compensating positions of the two quadrupole magnet rings.**



**Magnetic dipole field overlaid with the maximal field gradient created by turning both quadrupole rings in the same orientation. This configuration induces the maximal magnetic force on magnetized particles.**

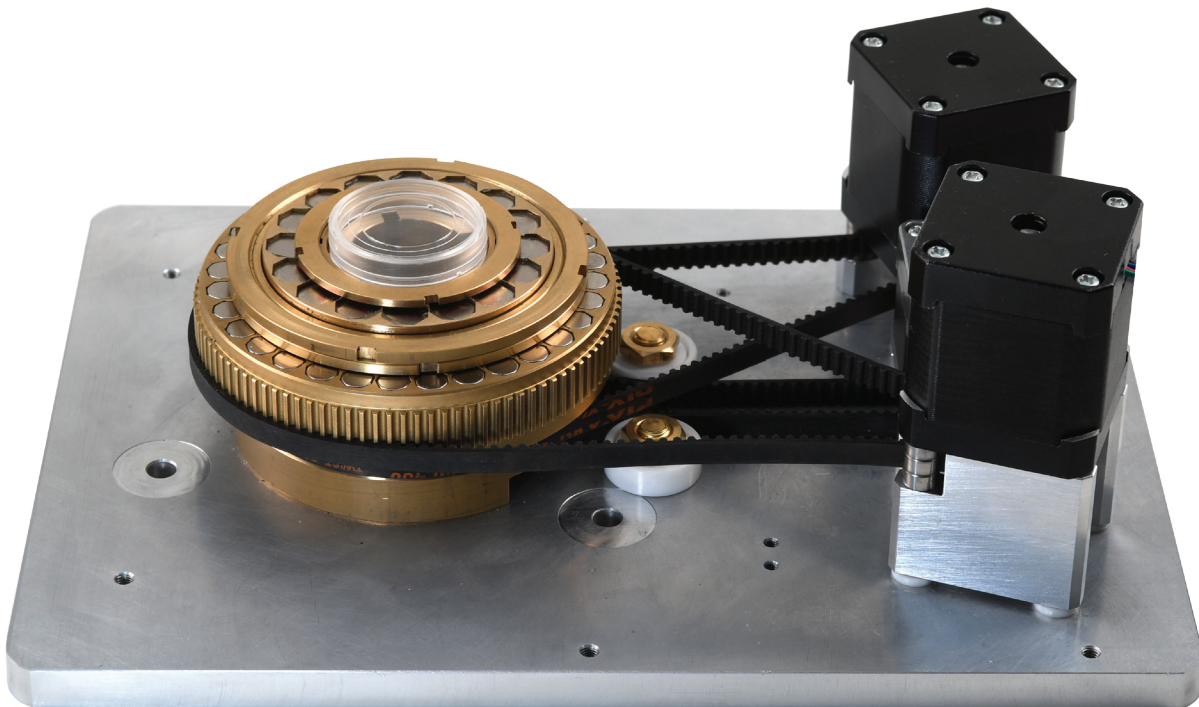


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## Properties

- ✓ Applicable for macroscopic and nanoparticles, nanoparticle doped cells, magnetic drug targeting...
- ✓ Widespread applications in life sciences, chemistry, physics...
- ✓ Neglectible power consumption and heat evolution, suitable for continuous operation
- ✓ Optimized for housing standard  $\varnothing$  35 mm glass bottom dishes
- ✓ Low construction height of only 60 mm, footprint of only 250 x 180 mm<sup>2</sup> by outsourced electronics – compatible with most transmitted light and reflecting microscopes
- ✓ Image transfer by relay optics with resolution 100...500  $\mu$ m preserves focusing and lateral displacement of focus point
- ✓ Homogeneous static field of 0.15 T for particle magnetization
- ✓ Superimposed spatially constant Gradient field of 0...6 T/m – tunable and 360° rotatable for controlled motion of magnetized particles
- ✓ Easy operation, steered by stepper motors
- ✓ Including electronics and software





## About SEKELS GmbH

SEKELS GmbH develops, produces and trades technical products which are mostly related with magnetism. With a team of about 25 employees, almost half of them being physicists or engineers, SEKELS presently serves more than 600 customers worldwide.

As an expert distributor of German VACUUMSCHMELZE GmbH & Co. KG we are offering an in-depth knowledge of their product lines and the applications, are available for technical consultation and provide fast availability of samples and series deliveries through comprehensive stock keeping and worldwide logistics.

SEKELS develops, designs and produces customer-specific laminations and core packages, magnetic shielding and shielding systems, inductive components and magnet systems - from prototyping to series deliveries.

## Contact

You need more information?  
Give us a call or mail. We are  
looking forward to support you.

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