



OCTOMAG

Centimeter-scale magnetic control for magnetic morphing, manipulation and actuation

BRIEF DESCRIPTION

The **OctoMag** is a large field generator with a spherical workspace of over 50mm diameter. Coupled with high magnetic field magnitudes, this allows users to explore a vast array of magnetic samples and applications. All of this is achieved within a compact, mobile framework, making the **OctoMag** the ideal tool for magnetic research in the lab.

The open-design nature of the workspace enables the user to integrate a multitude of third-party equipment for each specific research stream.

The **MBX Pro** software supporting the usage of the system presents an easy-to-use user interface customizable to the user's needs.

For the researcher aspiring to expand their discoveries beyond the confines of a microscope's glass slide the **OctoMag** is the ideal system.

APPLICATIONS

Magnetic manipulation

on milli to centimeter scale

In vivo and ex vivo experiments

in small animals (e.g., Zebra fish, mice, rabbits) and intact organs (e.g., pig eyes).

Versatile field generation

with built-in functions

Actuation

and studies of magnetic soft robots (e.g., metachronal waves, bistable magnetic structures)

Development of magnetically-

guided microsurgical techniques (e.g., eye surgery with micro-catheter)

Magnetic control

augmented with advanced control strategies, e.g., deep learning



OCTOMAG CHARACTERISTICS

50 mm

Diameter working
volume

2 T/m

Max gradient
strength

140 kg

Weight

50 mT

Max field
strength

10 Hz @ 20 mT

Max field
frequency

55x55x105 cm

Dimensions



Easy to install, self-contained,
mobile system



Magnetic actuation and
navigation on the centimeter
to micrometer scale in a large
workspace



Arbitrary magnetic field
and gradient control with 5
degrees of freedom



Rotating magnetic field
generation up to 10 Hz at
20 mT



Control Software with
intuitive GUI in a ROS-based
environment



Advanced customization
possible

ECB-820-ex EXTENDED ELECTRONIC CONTROL BOX

2.1 kW

Max power

96 VDC

Max output
voltage

120-230 VAC

Input Voltage

12 kg

Weight

44x33x18 cm

Dimensions

8

Channels

18 A

Max channel
current

MBX PRO Control Software

Preprogrammed to apply
static or time-dependent magnetic
fields and gradients. GUI presents
video of the workspace with field
visualization overlayed. ROS-
based with the possibility
for customizations.

COMPATIBLE PRODUCTS

Microscopes

Olympus and Leica or other dissecting
microscopes. Articulated arms are
recommended.

Cameras

Basler USB 3 cameras.

Third-party accessories

Can be conveniently mounted with pre-
threaded holes.

Input devices

Mouse & keyboard, SpaceNavigator®
(3DCONNEXION), PS5® controller

For information or requests about other
product's compatibility, please contact
us.

PUBLICATIONS

M. P. Kummer et al., "Octomag: An electromagnetic system
for 5-DOF wireless micromanipulation", IEEE Transactions
on Robotics, vol. 26, no. 6, pp. 1006–1017, 2010, <https://doi.org/10.1109/TRO.2022.3197107>

Q. Boehler et al., "On the workspace of electromagnetic
navigation systems", IEEE Transactions on Robotics, vol.
39, no. 1, pp. 791–807, 2023, <https://doi.org/10.1109/TRO.2022.3197107>

H. Gu et al., "Magnetic cilia carpets with programmable
metachronal waves", Nature Communications, vol. 11, no. 1,
p. 2637, May 2020, <https://doi.org/10.1038/s41467-020-16458-4>

