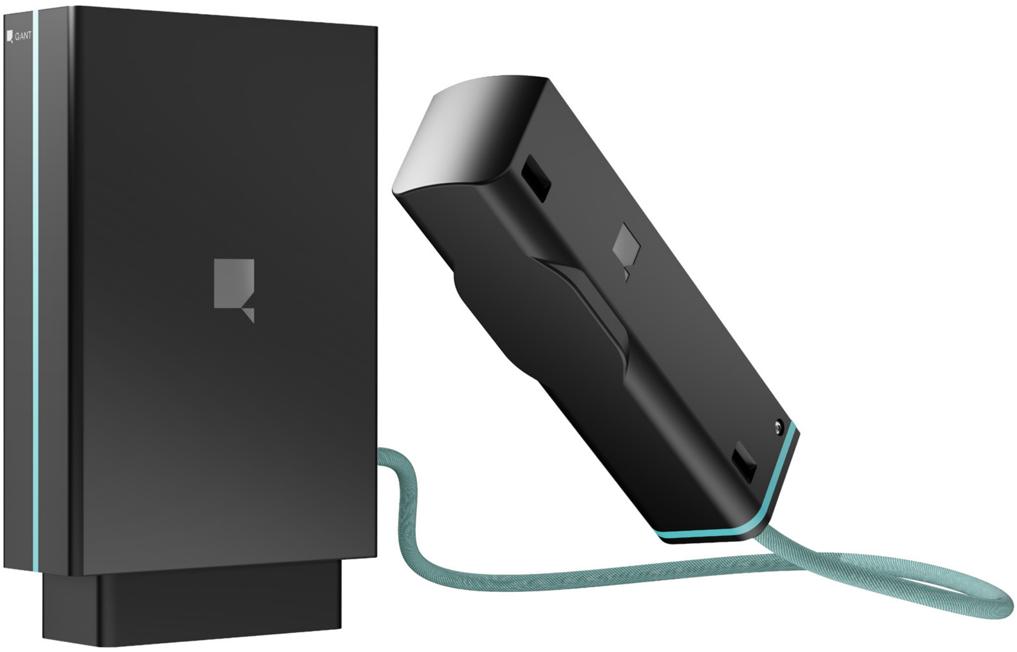
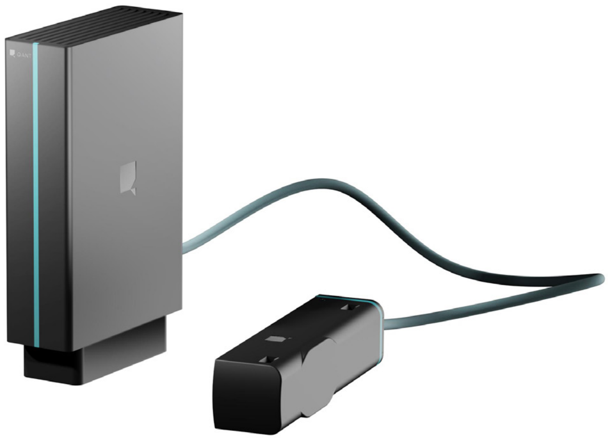


Native Sensing: New Dimensions of Magnetic Field Sensing

Highest sensitivity, room temperature operation
and compact design for research and industrial applications

10 pT/√Hz: Quantum technology opens up new dimensions in magnetic field measurements

Nearly all natural and technical processes generate electric fields essential for their function – for example neuronal signals in the human body or computer chip operations. Until now, measuring these electric fields has required direct contact, such as monitoring heart muscle activity through an ECG with direct skin contact or chip functionality testing through direct contacting. With its magnetic field sensor Q.M 10, Q.ANT introduces a paradigm shift in measuring extremely subtle electric fields. The sensor measures the magnetic field generated by the electric field, enabling precise and contactless monitoring of electrical activity and therefore the functionality of a natural or technical system. High-precision electric current and magnetic field measurements can thus be rethought.



Based on the principles of quantum physics, nitrogen vacancies (NV) in diamonds can be used to high-precisely measure magnetic fields. The Q.M 10 allows the measurement of very small magnetic fields in the range of 10 picotesla at room temperature in a compact size. The system consists of electronic components and a fibre-coupled sensor head, which is placed at the actual measuring point simplifying its integration into applications and making it robust and mobile enough to be applied in everyday situations. Its gradiometric approach allows for effective compensation of surrounding stray fields.

The advantages

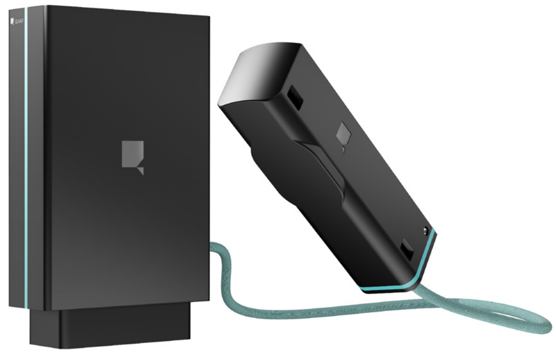
- Extremely high sensitivity under everyday conditions
- Wide dynamic range: Detects very small magnetic field changes even with strong background fields
- High spatial resolution
- Elimination of interfering signals
- Detection of magnetic field direction: Allows e.g. conclusions about the location of the magnetic field source
- Compact and portable system
- User-friendly Plug & Play system design

Early adopter program with customized pricing and features

Q.M 10, the next generation of Q.ANT‘s quantum magnetic field sensor, will be available in April 2025 and can be pre-ordered now. Q.ANT invites researchers and product developers to join the „Q.M 10 Early Adopter Program“ to explore new research fields and profit from a competitive edge before the official market launch of Q.M 10:

- Early access to initial sensors
- Collaborative product development workshops
- AI-driven data analysis
- Tailored business models with customized pricing

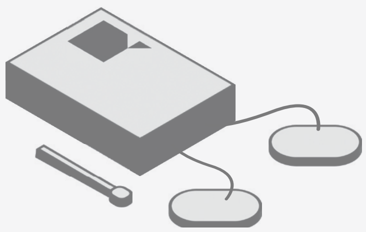
Performance data of the Q.ANT magnetometer Q.M 10



Size electronics	160 x 100 x 50 mm
Size sensor head	60 x 40 x 100 mm (customizable)
Weight	600 gr
Energy consumption	10 W
Interface	Ethernet
Resolution	10 pT/√Hz
Active sensing volume	0.5 x 0.5 x 0.5 mm
Dynamic range	2.7 µT (optional: resonance locking)
Laser wavelength	520 nm
Frequency bandwidth	DC–kHz (different operation modes)
Availability	April 2025 (pre-order now)

The next level of evolution – the gradiometer

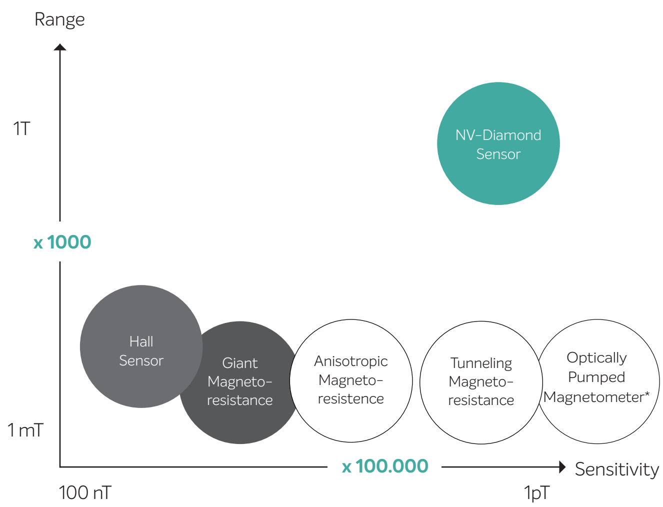
With the gradiometer, Q.ANT is already working on the next generation of magnetic field sensors. In addition to further miniaturisation, the gradiometric measurement effectively suppresses background noise and increases the resolution of the sensor.
The system consists of electronic components and fibre-coupled sensor heads, which are placed at the actual measuring point. This significantly simplifies integration into applications, and makes the sensor robust and mobile enough to be used and applied outside the laboratory.



The advantages

- Higher spatial resolution
- Elimination of interfering signals
- Miniaturisation for a wide application range
- Compactness and robustness for everyday applications

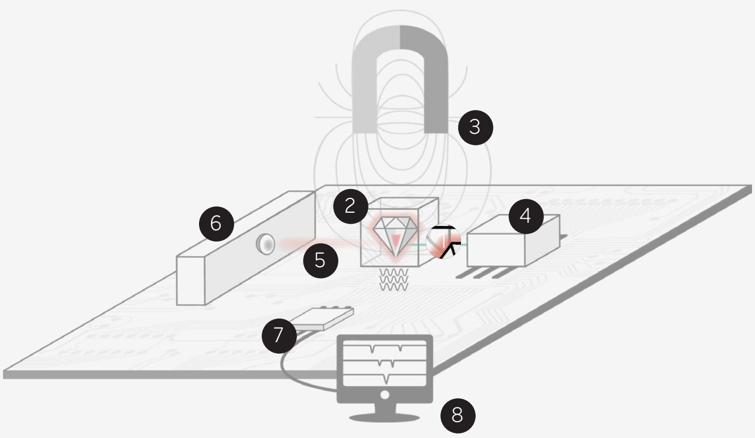
Advantages of diamond magnetometers over state-of-the-art magnetometers



*Further restrictions of OPMs: Low bandwidth of 200 Hz, Operation temperature 120 °C

- Room temperature operation
- High sensitivity (pT/sqrt(Hz))
- Large bandwidth (dc – kHz)
- Large dynamic range (up to several T)
- Contactless measurement
- Vector-magnetometry integratable
- Miniaturizable
- Biocompatible

NV Magnetometry: How the Q.ANT magnetometer works



1. Diamond: located at the heart of the sensor, the diamond becomes magnetic field sensitive by inserting an atomic lattice vacancy and a nitrogen atom, a so-called NV doping

2. Microwaves: bring the NV dopants into a magnetic field sensitive state

3. External magnetic field: has an effect on the sensor

4. Green laser: radiates onto the NV diamond and makes the NV dopants fluoresce with red light

5. Red fluorescent light: changes when external magnetic field changes

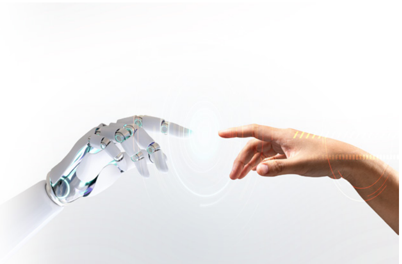
6. Photodetector: detects the fluorescent light

7. Control unit: processing of photodetector data

8. Monitor: user-friendly display of the signal

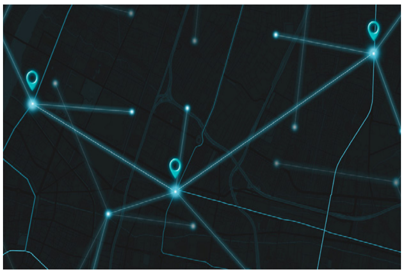
High precision magnetic field measurement for industry and science

NV magnetometers have been researched in science for many years. Under laboratory conditions, the suitability of the NV sensors for measuring the smallest magnetic fields down to below 1 pT could be demonstrated. This corresponds to magnetic fields that are 50,000,000 times smaller than the earth's magnetic field. Physical quantities such as temperature, current flow and pressure can also be resolved with the sensors. Q.ANT has set itself the goal of translating this technology into reliable sensors suitable for industrial use. Concrete scenarios are currently emerging in these areas:

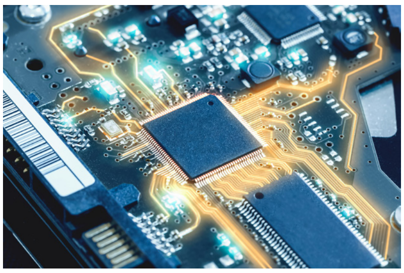


Human-Machine Interaction
Locally resolved measurement of muscle signals for an MMG-based prostheses and exoskeleton control enabling a new kind of Human-Machine-Interface.

Life Sciences
Research and diagnostics of muscular and neuronal activities for early detection of brain diseases and nervous system disorders, therapy monitoring and rehabilitation research.



Energy and Transportation
Analysis and control for energy generation, storage and performance optimization; GPS-independent navigation for indoor and outdoor automated guided vehicles.



Material Sciences
Current imaging for quality control of electrical and electronic components, e.g. circuit carriers or hard disks; identification of defects in the material structure of components and characterization of magnetic materials and nanoparticles.

Geophysics
Exploration of magnetic fields in the Earth's interior for the investigation of plate tectonics, detection and mapping of mineral deposits and characterization of magnetic materials and minerals.

Security
Microchip activity monitoring for the identification of side-channel attacks, detection of hidden electronic activity and detection of vessel movement for border control and infrastructure monitoring.

Q.ANT

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Everywhere where finest currents have to be measured, the quantum magnetometer opens up new possibilities. This technology enables a wide range of future-oriented applications in industry, research and medical technology, all the way to human-machine interaction.
The control of prostheses by muscle signals with the quantum magnetometer is a realistic scenario.

Michael Förtsch, Founder and CEO, Q.ANT

Founded in 2018, Q.ANT develops groundbreaking photonic quantum sensors and photonic processors opening up new use cases in high performance computing, artificial intelligence, medical technology, aerospace and mechanical engineering. Q.ANT's Native Sensing and Native Computing technology is based on its Para.Digm framework for generating, processing and detecting light.

www.qant.com/magnetometer

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