

NEW!



Manned, Drone-Based and Towed Magnetometers for Unexploded Ordnance Detection Applications

Since 1980

Leading the World of Magnetics

GEM Systems is the global leader in the manufacture and delivery of high precision magnetometers. Its proven solutions focus on Potassium (K) technology as well as Overhauser and Proton quantum technologies, and are a standard for Unexploded Ordnance Detection applications.

The advanced K-Mag (GSMP-35) is a standalone or turnkey solution developed with the requirements of UXO work in mind. With Potassium technology embedded, it enables high-resolution and high-sensitivity data acquisition from the ground. DRONEmag™ is a special version for drone UXO surveys.

GEM's towed platforms and drones also integrate one or multiple K-Mags combined with precise location information and high sensitivity to maximize responses from subtle anomalies.

For ground surveys, GEM has led the industry in magnetometers and gradiometers for decades. With K-Mag, Overhauser and Proton systems, GEM offers a solution for many geoscience and military applications.

GEM's gradiometers are also especially tuned for UXO work as gradients enhance shallow, subtle anomalies. We can configure a solution with both magnetometers and gradiometers.

With this experience and ongoing R&D, our clients benefit continuously from robust, proven solutions and high precision, quality results.
The difference really is in the data.



Chinese military personnel equipped with one of GEM's ground magnetometers - ready for a serious day of UXO detection and clearance. For UXO specialist work, GEM delivers the Potassium (K) Technology, which is the world's most sensitive quantum magnetometer for small, subtle buried targets.

Unexploded ordnance or UXO are potentially dangerous munitions of all sizes that remain buried in the subsurface from wars – even to this day. Many countries have UXO detection issues, including the UK, Australia, SE Asia, the Middle East and the United States. The real issue comes when a use is proposed for a site, such as an infrastructure or construction project. Then, the requirement becomes finding the UXO through surveying and clearing UXO until the site is remediated and it is approved for safe use.

GEM Systems ultra lightweight Potassium (K-Mag) technology is fast becoming the magnetometer of choice for UXO detection and clearance operations – complementing GEM's Proton systems pictured above. The K-Mag delivers ultra-high sensitivity to recognize subtle signatures from shallow or deeply buried targets and high sampling. The K-Mag is a precision instrument that is often used because of its high durability and versatility during manned operations.

GEM Systems K-Mag sensor is a reliable and proven technology that can be used to help determine the six key UXO survey parameters — including x and y position, depth, type of UXO, and inclination and declination of the UXO. In addition, a magnetic survey will also show buried infrastructure, such as pipes, that could affect the UXO remediation efforts.

Backed by more than 30 years of R&D, GEM's K-Mag has the highest sensitivity of any UXO magnetometer. High sensitivity is important because target responses diminish with distance from the target – and high sensitivity compensates – to help detect even subtle signals from the ground or air.

Reasons for the K-mag's widespread use include the technology's extreme gradient tolerance of up to 50,000nT/m combined with fast sampling of 20 Hz (20 samples per second) -- which is optimal for manned measurements and data acquisition from platforms. And, while Cs and other sensors have heading errors, K technology maintains true data integrity via the quantum physics of its narrow spectral line.

A New Means of Detecting Small UXO from the Air

The air is promising new efficiencies in detecting small UXO that are still remaining in the ground or missed in other surveys. The AirGRAD is GEM's newest solution and is the world's first UAV towable vertical gradiometer! At a weight of 6.0kg, the turnkey gradiometer solution includes two high sensitivity ultra-light DRONEmag™ magnetometers, plus all components required for a precise UXO gradiometer survey.

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Our World is Magnetics.

UAV UXO configurations include the AirGRAD (vertical gradiometer) to the left and a towed DRONEmag™ on a GEM Copter (Multi-Rotor) to the right. GEM's UAV Solutions can target what has been missed by other searches or survey dangerous areas. Available as standalone DRONEmag™ magnetometer, AirBIRD and AirGRAD towed systems, or as turnkey UXO drone solutions.



GEM UXO Survey Systems – Manned, Drone-Based and Towed Platforms

Drone-Based UXO Surveys

UXO surveys are increasingly looking to new platforms to scan more thoroughly, and in some cases, to re-visit sites that have already been cleared but found to have more UXO contained. These platforms include manned surveys; towed or pushed ground platforms; and drones. GEM delivers both standalone magnetometers and gradiometers, and turnkey systems designed specifically for these UXO needs.

In applications where UXO sites are large, time is limited, or walking is simply too dangerous, drone magnetic surveys are becoming part of the answer and it's easy to see why. While a comparative manned ground survey takes 10 days of field work with associated personnel safety issues, a UAV survey with DRONEmag™ completes 100 km of low-level work in a single day. GEM's high-sensitivity Potassium technology can discern even small signals just above the noise threshold.

Drone-Based and Towed Platforms

As shown previously, military personnel equipped with Proton magnetometers can clear a substantial amount of territory – given time. The advantage of GEM's magnetometers, including the K-Mag, Overhauser, and Proton, is that they are all lightweight and speed up clearance efforts significantly. The K-Mag is the most sensitive system and the Overhauser and Proton systems are proven for UXO applications on projects around the world.

Platform-Based Ground UXO Surveys

Increasingly, organizations are looking to add the benefits of multiple sensors to towed, wheeled platforms. With GEM's custom ground survey platform, you can add up to 10 Potassium magnetometers with fast data acquisition (sample rates up to 20 Hz) and oriented in horizontal and/or vertical gradiometer formats. GEM's K-Mag is ideally suited for integration with electromagnetic systems on a single platform – truly a one-two combination for combatting the issues of UXO detection, characterization and remediation. For more details on standalone, towed or drone UXO solutions, contact GEM today.

Magnetometer Specifications

Performance

Sensitivity: 0.0002 nT @ 1 Hz
 Resolution: 0.0001 nT
 Absolute Accuracy: ± 0.1 nT
 Dynamic Range: 20,000nT to 120,000 nT
 Low/High Field Options: 3000 to 350,000 nT
 Gradient Tolerance: 50,000 nT/m
 Sampling Rate: 1, 5, 10, 20 Hz

Orientation

Sensor Angle: optimum angle 35° between sensor head axis & field vector
 Proper Orientation: 10° to 80° & 100° to 170°
 Heading Error: ± 0.05 nT between 10° to 80° and 360° full rotation about axis

Environmental

Operating Temperature: -40°C to +55°C
 Storage Temperature: -70°C to +55°C
 Humidity: 0 to 100%, splashproof

Dimensions & Weights

Sensor: 161mm x 64mm (external dia) with 2m cabling ; 0.43 kg
 Electronics Box: 236mm x 56mm x 39mm; 0.46 kg
 Option 1 cabling; .125kg
 Option 3 light weight battery; .250kg

Power

Power Supply: 22 to 32 V DC
 Power Requirements: approx. 50 W at start up, dropping to 12 W after warm-up
 Power Consumption: 12 W typical at 20°C
 Warm-up Time: <10 minutes at 20°C

Outputs

20 Hz RS-232 output with comprehensive Windows Personal Computer (PC) software for data acquisition and display

Outputs UTC time, magnetic field, lock indication, heater, field reversal, GPS position (latitude, longitude altitude, number of satellites)

Components

Sensor, pre-amplifier box, 2m sensor / pre-amplifier cable, (optional cable 3-5m) manual & ship case

Related UXO Systems – Ask for More Details regarding Ground, Airborne and UAV Solutions

GEM Systems provide the Industry Leading 3 year Warranty



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