

# MagArrow

## UAV-Enabled Magnetometer



### Survey large areas of inaccessible terrain 10x faster than a typical magnetic survey

The MagArrow by Geometrics is our first ever UAV-enabled magnetometer, and it sets the new standard for UAV magnetic surveys. The MagArrow is engineered to address the limitations of both large manned and small helicopter surveys that geoscientists often encounter. To meet these special survey conditions, the MagArrow was built with reliability, flexibility, and ease of use in mind.

The MagArrow consists of an aerodynamic, light-weight carbon fiber shell with internal electronics including the battery, MFAM™ magnetic sensors, and GPS. The MFAM™ sensors in the MagArrow are our most groundbreaking sensors yet, capable of highly precise measurements in an extremely lightweight and tiny package. Both MFAM™ sensors side by side are smaller than a golf ball. Our system is composed of the MagArrow magnetometer and a full data collection software package.

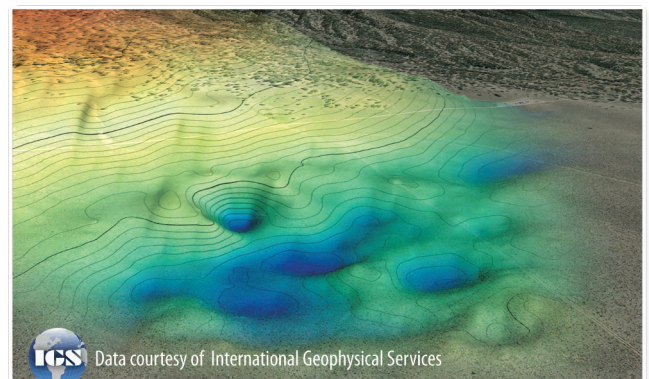
Operation in the field is simple. Survey details are programmed into the user's UAV software of choice. The MagArrow is turned on, and once airborne, preprogrammed GPS waypoints carry the MagArrow in altitude stable survey lines. Once work is completed, data from the MagArrow can be wirelessly downloaded to a computer.

The MagArrow is a robust yet flexible system that can adapt to changing field conditions and new user workflows. The MagArrow can be attached easily to a wide variety of enterprise UAV's, and the MagArrow's 1000 Hz sample rate and synchronized on-board GPS allow it to function independently of the UAV and the UAV software. With such a fast sample rate, surveys can be completed at speeds up to 10 m/s with samples collected every 1 cm. How will you use the MagArrow?

## FEATURES & BENEFITS

- **Lightweight** – Weighs only 1 kg, allowing a flight time 20% longer\* than a 2.5 kg-payload UAV.
- **UAV Agnostic** – Attachment system is easily configurable, use your existing enterprise UAV.
- **Self-Contained** – GPS, storage, and WiFi on board, no data connections to UAV needed.
- **Super-Fast Sampling Rate** – Fly faster, up to 10 m/s with samples every 1 cm. Filter out UAV motor noise.
- **QC in the Field** – View and QC data in the field using any device with a web browser app interface.
- **Long Battery Life** – 2 hours of battery life will outlast multiple UAV flights. Hot swappable.

\*DJI Matrice 600 Pro



"The UAV-enabled MagArrow also fills the gap between pilot-on-board aeromagnetic surveys and ground magnetic surveys where the areal size of the survey is too small to justify a pilot-on-board aeromagnetic survey, or the need for low altitude flight operations makes a pilot-on-board survey too risky or too costly."

— Ron Bell of International Geophysical Services, MagArrow user.

## POWERFULLY BUILT, SIMPLY EXECUTED

For simplicity in the field, the MagArrow has no external connections, instead containing the GPS, WiFi, and storage on board. Battery packs are hot swappable. All operations are accessed through the web-browser or Android app interface. Internal IMU sensors allow for a complete suite of data compensation algorithms to be applied, if desired, to remove platform-induced field changes.

**Operating Principle:** Laser pumped cesium vapor (Cs133 non-radioactive) total field scalar magnetometer.

**Operating Range:** 20,000 to 100,000 nT.

**Operating Zones:** Configurable for operation anywhere in the world without dead zones.

**Dead Zone:** 60° Polar only.

**Noise/Sensitivity:**  $0.005\text{nT}/\sqrt{\text{Hz}}_{\text{rms}}$  typical.

**Max Sample Rate:** 1000 Hz.

**Bandwidth:** 400Hz.

**Heading Error:**  $\pm 5$  nT over entire 360° equatorial and polar spins typical.

**Output:** WiFi data download over 2.4GHz WiFi access point.

**GPS:** Adafruit™ GPS with 1 m accuracy and 10  $\mu\text{s}$  timing.

**USB Port:** Port for USB flash drives.

**Data Storage:** 32 Gbyte Micro SD card. Not field-accessible.

**Data Format:** ASCII XYZ.

**IMU:** Bosch BMI160 Accel/Gyro – 200 Hz sample rate.  
Honeywell HML5983 Compass – 100 Hz Sample rate.

**Total Weight:** 1 kg.

**Length:** 1 m.

**Data Logger:** User-supplied web browser-capable device.

## BATTERY

**Battery Connection:** 2x XT60 connectors for 206 type batteries.

**Battery Recommendations:** Non-magnetic 1800 mAh lithium polymer.

## ENVIRONMENTAL

**Operating Temperature:**  $-10^{\circ}\text{C}$  to  $+40^{\circ}\text{C}$  ( $+14^{\circ}\text{F}$  to  $+104^{\circ}\text{F}$ ).

**Altitude:** Up to 3,000 m (10,000 ft). Typically limited by UAV maximum altitude.

**Humidity:** Non-condensing.

## ACCESSORIES

**Standard:** Operation manual and carrying case.

**Warranty:** 1 year.



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