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Advantages of Potassium with GPS over Cesium Magnetometers

Potassium is the only optically pumped magnetometer that operates on a single, narrow electron spin resonance (ESR) line is contact to other alkali vapour magnetometers that use an irregular, composite and wide spectral lines and Helium with the inherently wide spectral line.

Narrow line widths along with relatively high Lamour frequency (7Hz / nT) are a basis for some unique features and major benefits Potassium magnetometers offer.

1. Highest sensitivity in a magnetometer / gradiometer for definition of anomalies missed by or too subtle for Cesium. Potassium is the only commercially available magnetometer that breaks the 1pT / Hz1/2 level of sensitivity. Sensitivities as high as 0.03pT / Hz1/2 are available in different designs of the instrument.

2. Highest absolute accuracy for effectiveness in operation of gradiometers and multi-sensor gradiometeters. The single regular spectral line operation guarantees an absolute accuracy matching or surpassing the absolute accuracy of Cesium magnetometers.

3. Faster sampling rates for efficiency in high speed manned or vehiclular surveys. Standard potassium magnetometers operate at 20 readings per second. GEM is unique is also offering higher speeds as an option.

4. Lower heading error for high data quality. The composite spectral line of Cesium and other vapour magnetometers changes its shape as a function of sensor orientation in the magnetic field – resulting in a significant heading error (+/- 1 nT). In contrast, the Potassium single line has virtually no dependence on sensor – field orientation.

In practice, less than 0.1nT changes are easily achieved.

5. Low maintenance costs. Being of very uncritical design, Potassium sensors need not be aligned or ever realigned in operation. Users may replace the Potassium lamp in the field if and when it reaches the end of its life. No other part of the sensor ever needs a replacement.

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6. Fully interchangeable sensors. Non-critical design allows sensor – sensor electronic interchangeability, which can be a valuable feature while operating in remote areas.

7. Excellent field tracking. Bandwidth of Potassium magnetometers is set to some 700Hz. This allows the system to track the field changes very rapidly without a loss of lock. Tracking of some 5000 – 10,000nT per second is a standard feature of our Potassium magnetometers.

8. Fast start-up and recovery. Potassium is a passive system (in contrast to self-oscillating one) where voltage controlled oscillator frequency gets locked to Potassium Lamour frequency signal. Locking is acquired by sweeping the VCO frequency over a range of fields. First lock and / or relocking in case of a loss of lock is fast. Only a few seconds are needed to perform this operation.

9. Various sensor options. The user may specify his required sensitivity and we will provide it by a custom sensor design. Standard size of sensor cell is 7cm. Smaller and larger cells are available to achieve special effects: higher sensitivity by increasing the size of cell or conveniently smaller size of sensor for higher gradient tolerance or other purposes.

GEM also delivers a range of GPS and DGPS systems that enable customers to perform magnetic surveys with a variety of positioning accuracies, according to their application needs and budgets.

GEM is the only commercial magnetometer manufacturer to offer built-in GPS / DGPS. The advantages of this approach include a truly seamless and integrated positioning solution that minimizes weight and simplifies survey procedures.

Some other advantages are:

1. GPS surveying eliminates the need to provide a grid prior to surveying for more efficient project work

2. Specially designed non-magnetic GPS is available in two options - built-in and external - for the greatest range of solutions and choices available today:

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a. Internal GPS positions available in real time using WAAS with DGPS available through post-processing

b. External GPS provides DGPS values in real time using subscription service, such as Raycal or Omnistar

3. Internal GPS delivers <1.5m survey resolution (suitable for mineral exploration surveys) at lower cost than with cesium systems

4. Internal GPS eliminates cabling for greater reliability in the field

5. Internal GPS provides outstanding performance even in challenging environments (foliage, canyons) according to manufacturer's specifications

6. Both internal and external GPS provides onscreen navigation automatically without using light bar components for lower investment than Cesium units

7. Survey waypoints can be preprogrammed (up to 1000) prior to performing field work for highly efficient field operation

8. Implementation of custom GPS datums as required by customer to provide maximum survey precision and accuracy