



# Monitoring

Observatory / Volcanology Magnetometer (GSM-90 v7.0)

The industry-standard v7.0 EUROMAG system is the latest innovation in Overhauser design - with many new technologies that deliver significant benefits for long-term monitoring applications.

Key technologies include:

Integrated GPS (time reception) option ... the only system with fully built-in GPS

25% increase in sensitivity over GEM's v7.0 system

Choice of sampling rates from 3 seconds, 1 second and 0.2 seconds ... with variable sampling intervals to 3600 seconds

Weather-proof housing for harsh environments

Overhauser sensor with enhanced robustness

Rapid data transfer at speeds up to 115 kilobaud (using GEM's proprietary GEMLinkW software)

Internet-based upgrades (from the office or field)

And all of these technologies come complete with the most attractive prices and warranty in the business!



GSM-90 Overhauser Magnetometer instrumentation installed at British Geological Survey (BGS) observatory station in Eskdalemuir, South Scotland.

The GSM-90 EUROMAG is a scalar magnetometer of high absolute accuracy (0.2nT) and low long term drift (0.05nT / year). It is optimized for use in magnetic observatories, long term monitoring arrays in volcanology, etc. where the following are essential:

- \* long term stability and high accuracy
- \* high resolution and low noise (0.022nT)

The EUROMAG is deployed in many installations, notably in observatories and on Mt. Etna, where dedicated scientists from the Istituto Nazionale di Geofisica e Vulcanologia (INGV) are using the system as a cornerstone of their research into the periodic eruptions of Europe's most active volcano.

## Operating Principles

The EUROMAG is based on GEM's Overhauser Effect technology. The EUROMAG sensor has a free radical added ... in contrast to standard proton magnetometer sensors which only use a proton-rich liquid to produce precession signals. The free radical contributes free, un-bound electrons that couple with protons producing a two-spin system.

A strong RF magnetic field is used to disturb the electron-proton coupling. By saturating free electron resonance (ESR) lines, the polarization of protons in the sensor liquid is strongly increased.

Therefore, the Overhauser Effect offers a superior method of proton polarization -- delivering stronger signals from smaller sensors and with less power (i.e. 2Ws per reading or about 0.5W average power consumption for 1 reading per 5 seconds).

GSM-90 electronics are packaged in a thick, waterproof aluminum box specially designed to operate reliably in harsh environments. It is also microprocessor-based with full remote control capability. Results are made available in serial form (RS-232C interface) for collection by data acquisition systems.

## Specifications

Sensitivity:	0.022 nT / $\sqrt{\text{Hz}}$
Resolution:	0.01 nT (gamma)
Absolute Accuracy:	0.2 nT
Dynamic range:	20,000 - 120,000 nT
Long term stability:	<0.05 nT/year
Sampling - Model GSM90:	1 sample / 3 sec
Sampling - Model GSM-90F1:	1 sample / 1 sec
Sampling - Model GSM-90F5:	5 samples / 1 sec
Sensor size:	70mm dia. X 150mm
Power:	12V 200mA maximum, 40mA average
RS232C parameters:	programmable

\* For the ultimate in low power operation, consider our GSM-90L requiring only 100mW for 1 reading in 5 seconds or 300mW for 1 reading per second.