

FGL ABSOLUTE GRAVITY METER



The FGL was designed in 2005 to incorporate the small size and convenience of the A10, with the proven performance of the FG5.

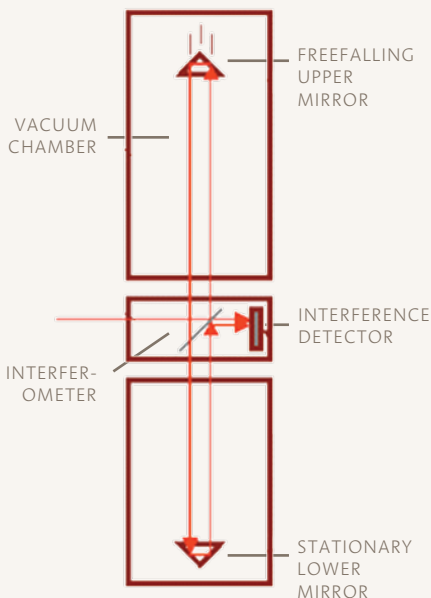
PRINCIPLE OF OPERATION

The FGL operates by using a free-fall method. An object is dropped inside a vacuum chamber and its position is monitored very accurately using a laser interferometer. In 2004, the BIPM (Bureau International de Poids et

Mesures) proclaimed the ballistic freefall method as an official primary method for measuring gravity.

The free-fall trajectory of the dropped object is referenced to a very stable active-spring system called a “Superspring”. The Superspring provides seismic-isolation for the reference optic to improve the noise performance of the FGL.

The optical fringes generated in the interferometer provide a very accurate distance measurement system that can be traced to absolute wavelength standards. Very accurate and precise timing of the occurrence of these optical fringes is done using an atomic rubidium clock that is also referenced to absolute standards.



The measurement is directly tied to international standards, and this is what makes the FGL an absolute gravimeter. By basing the measurement on these standards, the system is inherently calibrated and will neither drift nor tare over time.

FGL APPLICATIONS

GEOPHYSICAL RESEARCH

- Vertical crustal motion detection
- Complementary verification of displacements measured with GPS and VLBI
- Volcanic magma flow monitoring
- Postglacial rebound studies
- Uplift of subduction studies
- Earthquake research
- Long period tidal monitoring and earth inelasticity modeling

PRECISION MEASUREMENTS AND CALIBRATIONS

- Pressure transducer and load cell calibration
- Redefinition of the kilogram in the SI system of units
- Big G determinations and equivalence principle
- Calibration of superconducting and other high precision relative gravity meters

ENVIRONMENTAL MONITORING

- Water table monitoring in deep and/or multiple aquifers
- Nuclear waste management and cleanup
- Global sea level studies for global warming

EXPLORATION AND RESOURCE MANAGEMENT

- Oil exploration
- Mineral exploration

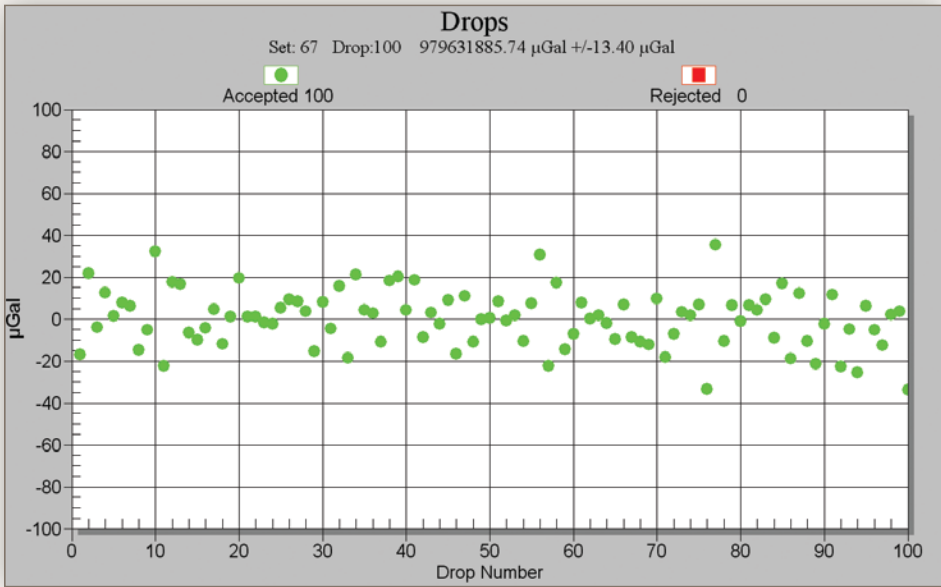
INERTIAL NAVIGATION

- Gravity reference station determinations
- Relative gravity network control points
- Establishing geodetic tie points for gravity networks
- Defining the geoid

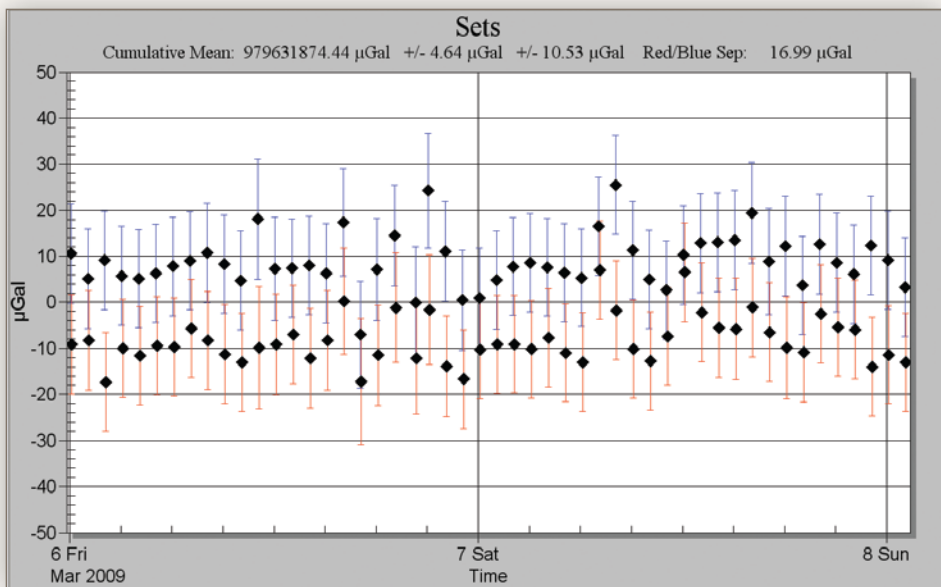
INSTRUMENT FEATURES

- Streamlined upgrade path to FG5 gravimeter system
- Automatic data acquisition and system controller (Microsoft Windows®-based laptop PC)
- Real-Time data processing automatic data storage
- Optional environmental Monitoring Package: includes automatic logging of barometric pressure, ambient temperature and other system information
- Real-time gravity corrections for tides, ocean loading, polar motion, and atmospheric attraction
- “Superspring” long period (20-30s) active isolation device
- Built in collimation optics for verticality alignment
- Drag-free chamber eliminates residual drag on freefall object
- Frequency stabilized HeNe laser (Iodine stabilized HeNe laser option available for highest accuracy applications)
- Built in Rubidium atomic clock
- Ion-vacuum pump with battery backup power supply
- Custom-built shipping containers

EXAMPLE DATA DESCRIPTION



Shown above are typical gravity measurements. Note final precision after 2 minutes is approximately $2\mu\text{Gal}$.



Shown above are typical gravity values for sets of 100 measurements. The final precision is less than $2\mu\text{Gal}$.

GENERAL SPECIFICATIONS

TOTAL SHIPPING WEIGHT	140 kg in 6 containers
TOTAL VOLUME	1.5 m ³
FLOOR SPACE REQUIREMENT	3 m ²
INPUT VOLTAGE	110-240 VAC, 50-60 Hz
NOMINAL POWER REQUIREMENT	~500 W

PERFORMANCE SPECIFICATIONS

ACCURACY	10 μ Gal (Absolute)
PRECISION	10 μ Gal in 10 minutes at a quiet site
OPERATING DYNAMIC RANGE	World-Wide
OPERATING TEMPERATURE RANGE	20°C to 30°C



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