

# A10 PORTABLE ABSOLUTE GRAVITY METER



Since its inception in 2000, the A10 has become the industry standard in portable absolute gravity field instrumentation. Based directly on international standards of time and distance, this ruggedized, temperature-controlled cousin of the FG5 laboratory instrument provides unmatched accuracy and precision in the harshest environments.

## PRINCIPLE OF OPERATION

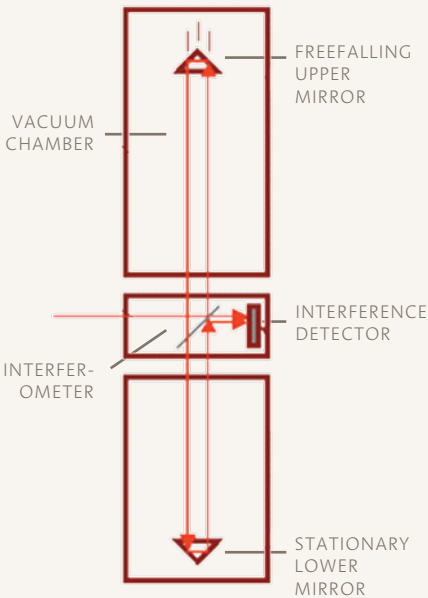
The A10 operates by using a free-fall method. An object is dropped inside a vacuum chamber and its position is monitored very accurately using a laser interferometer. In 2004, the BIPM (Bureau International de Poids et

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 A10.

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 A10 an absolute gravimeter. By basing the measurement on these standards, the system is inherently calibrated and will neither drift nor tare over time.



## A10 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

### EXPLORATION AND RESOURCE MANAGEMENT

- Oil exploration
- Mineral exploration
- Oil & gas reservoir monitoring

### ENVIRONMENTAL MONITORING

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

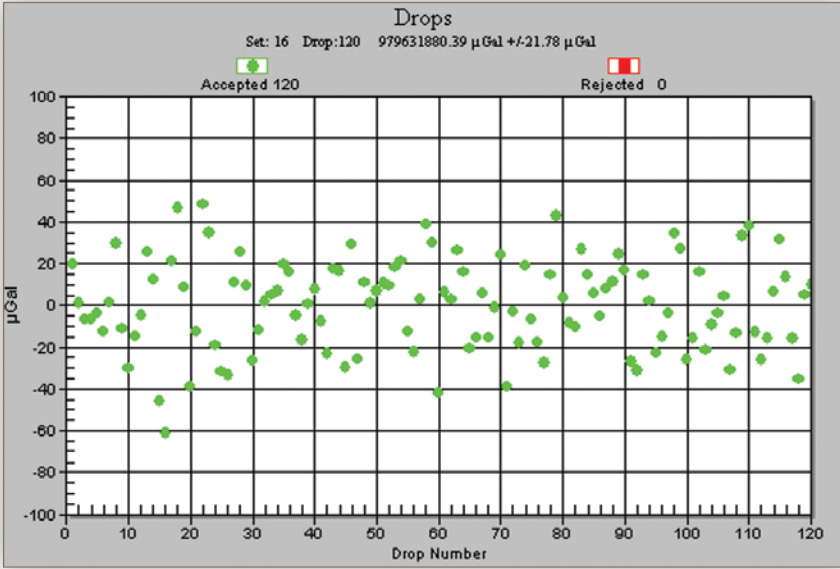
### INERTIAL NAVIGATION

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

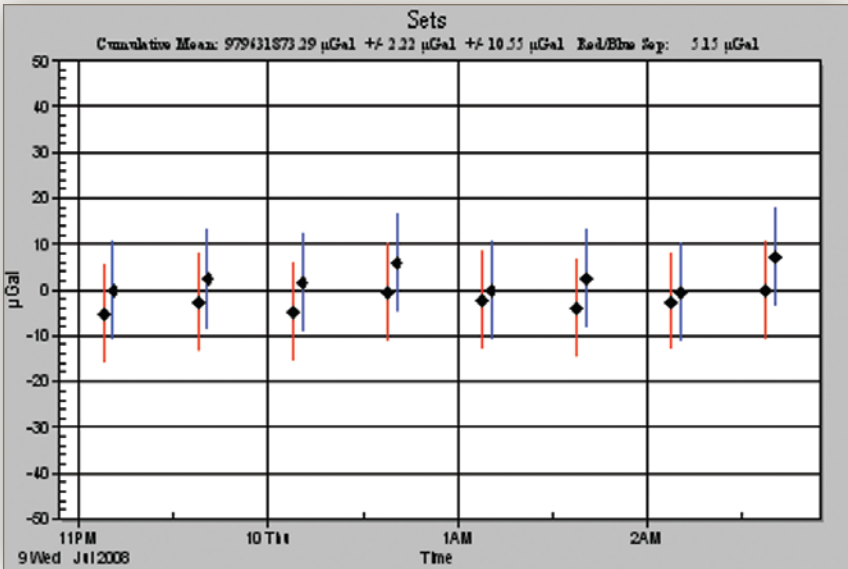
## INSTRUMENT FEATURES

- Automatic data acquisition and system controller (Microsoft Windows®-based laptop PC)
- Field ruggedized, temperature controlled system
- Automatic leveling system
- Real-Time data processing automatic data storage
- Included monitoring package provides automatic logging of barometric pressure and critical system parameters
- “Superspring” long period (20-30s) active isolation device
- Real-time gravity corrections for tides, ocean loading, polar motion, and atmospheric attraction
- Built in collimation optics for verticality alignment
- Drag-free chamber eliminates residual drag on freefall object
- Frequency stabilized HeNe laser
- Built in Rubidium atomic clock
- Ion-vacuum pump with battery backup power supply
- 12VDC power base (with 100-240VAC laboratory power supply included)
- 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 120 measurements. The final precision is less than 1.



A10 deployed from a Sno-Cat in the Arctic (-40°C. Note these extreme conditions require slight modifications to the standard instrument configuration).



A10 deployed from a light vehicle in Australia (+40°C. Note these extreme conditions require slight modifications to the standard instrument configuration)

## GENERAL SPECIFICATIONS

<b>INPUT POWER</b>	12-14 DC (vehicle or from lab based 100-240VAC supply –included)
<b>FULL LOAD</b>	25A (300W)
<b>AVERAGE LOAD</b>	16A (200W)
<b>WEIGHT</b>	
Upper Unit	19kg
Lower Unit	21kg
Electronics and Computer	23kg
Cables	7kg (each)
Deployment Boxes	25kg(each)
Total	105kg

## PERFORMANCE SPECIFICATIONS

<b>ACCURACY</b>	10 $\mu$ Gal (Absolute)
<b>PRECISION</b>	10 $\mu$ Gal in 10 minutes at a quiet site
<b>OPERATING TEMPERATURE</b>	-18°C to +38°C continuous operation



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