Grad-13

Digital Three-axis Gradiometer

Bartington® Instruments

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The Grad-13 provides high resolution vector measurements of the strength and direction of magnetic fields on land or in water (submersible to 200m). The small orthogonality error and digital correction allow for scalar measurements to be made. It can be integrated into multi-sensor arrays, or used singly for applications such as geophysical surveying, locating pipes and cables, and downhole surveys.

Features

- Baselines from 500mm to 1000mm.
- Land and submersible (200m) versions.
- Measuring range of ±70 or ±100µT.
- Integral three-axis accelerometer with ±2g range.
- Individual sensor and gradient outputs.
- Gradiometer can be connected to a computer using readily available RS485 to USB or Ethernet converters.
- Gradient noise <20pTrms/√Hz/m at 1Hz with 500mm baseline.

Typical Applications

- Detection of buried magnetic anomalies such as unexploded ordnance (UXO) by surface or downhole surveys.
- Geophysical surveys for archaeology and mineral exploration.
- Pipe and cable location.

Product Identification

Product name	Baseline in mm	Package
Grad-13	500 750 1000	L = Land S = Submersible to 200m

Example: Grad-13-500S is a gradiometer with a 500mm baseline, submersible to 200m.

Grad-13 Specifications

Gradiometer Performance	
Output generated	Digital RS422 output includes: • 3-axis magnetic field gradient data • 3-axis magnetic field sensor data • 3-axis accelerometer data (Data protocol DP2629 is available from Bartington Instruments)
Number of axes	Three (for each of two sensing elements)
Baseline between sensors	500, 750 or 1000mm
Bandwidth (at -3dB)	>1kHz
Measuring range	±70µT or ±100µT
Maximum gradient	2x Measuring range
Gradient Measurement noise floor	<20pTrms/√Hz/m at 1Hz with 500mm baseline
Scaling error	±0.1%
Temperature coefficient of scale factor	<35ppm/°C
Settling time at power up	15mins
Offset error	<10nT in zero field
Temperature coefficient of offset error	±0.4nT/°C
Orthogonality error	<1° (<0.03° after balancing)
Linearity error	<0.0015%
Hysteresis	<1nT in 100µT
Data conversion	24 bit oversampled

Accelerometer Performance	
Number of axes	Three
Range per sensor	±2g
Update rate	40Hz
Resolution	>10 bits
Offset error	±70mg (X-Axis), ±90mg (Y&Z Axes)
Scaling error	<±10%
Temperature coefficient of offset error	±0.2mg/°C
Temperature coefficient of scale factor	±0.025%/°C
Alignment error	±2° from each magnetic axis

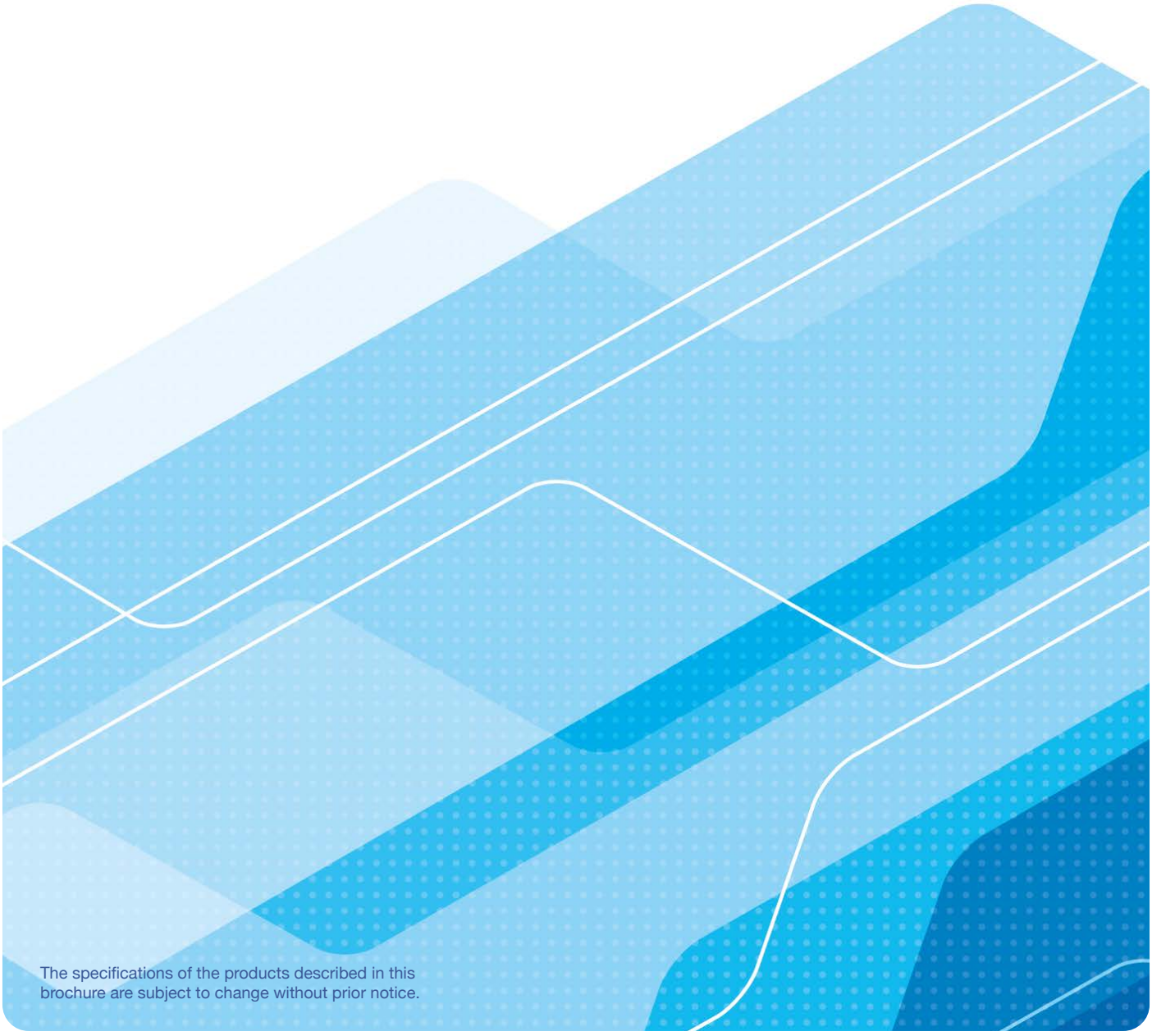
Environmental	
Operating temperature range	-30°C to +85°C
Storage temperature range	-40°C to +85°C
Environmental protection Grad-13L Grad-13S	 IP67 IP68 Submersible to 200m

Mechanical		
	Grad-13L	Grad-13S
Dimensions (excl. cable tail) for 500mm baseline for 750mm baseline for 1000mm baseline	 ø35 x 677mm ø35 x 927mm ø35 x 1177mm	 ø38 x 677mm ø38 x 927mm ø38 x 1177mm
Weight - 500mm baseline (incl. cable tail)	1.4kg (1.7kg and 2.0kg for 750mm and 1000mm baseline respectively)	1.6kg in air (1.9kg and 2.2kg for 750mm and 1000mm baseline) Sinking in sea water
Enclosure material	Carbon fibre & PEEK	
Connector and tail	5m long tail with 8-way Amphenol 62GB-16J12-08PN	5m long tail with 7-way Impulse MSAJ-7-CCP
Mating connector	62GB-57A12-08SN (bulkhead)	7-way Impulse MSAJ-7-CCR (cable mounted) or MSAJ-7-BCR (bulkhead)

Electrical	
Voltage input	+9V DC min, +32V DC max
Power consumption	<5W
Digital output standard	RS422 full duplex
Baud rates	115.2kB/s, 460.8kB/s, 921.6kB/s

Optional Accessories

Grad-13L	Grad-13S
Dual port battery box with USB output Charger for battery box USB lead 8-port multiplexing box with Ethernet output Charger for multiplexing box 5m extension cable (other lengths available on request) Non-Magnetic Cart (see DS3142 from Bartington Instruments)	5m gradiometer underwater extension cable (other lengths available on request) 5m gradiometer underwater-to-land cable (other lengths available on request): connects to land battery box or land multiplexing box
Gradiometer acquisition software (Microsoft Windows only)	



The specifications of the products described in this brochure are subject to change without prior notice.

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