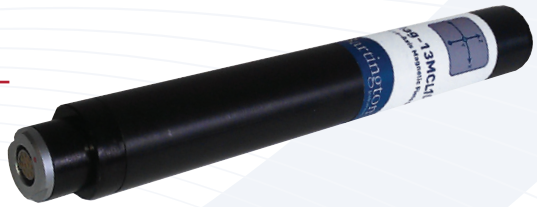
Mag-13 Three-Axis Magnetic Field Sensors

The Mag-13 range of sensors provide high precision, low noise measurements of static and alternating magnetic fields. Different combinations of noise level, measuring range and enclosure make the sensors suitable for use in a wide range of applications in physics, geophysics, bioelectromagnetics, mineral exploration and defence.

Packaged Mag-13 sensors are environmentally sealed against dust and water ingress to a depth of at least 1 metre, and shielded from electrical interference.

All sensors have an integrated test coil that removes the need for a separate calibration unit, and a temperature sensor.

Features



- Square section, cylindrical and deep submersible enclosures
- Unpackaged version available
- Three noise levels:
  - Low 'L': <6pTrms/√Hz at 1Hz
  - Very low 'Q': <5pTrms/√Hz at 1Hz
  - Ultra low 'Z': <4pTrms/√Hz at 1Hz
- Measuring ranges of ±60µT ('L' and 'Q' only) and ±100µT
- Bandwidth of 3kHz
- Environmentally sealed and shielded from electrical interference
- Integrated test coil and temperature sensor

Typical Applications

- Integration in surveillance systems
- Magnetic signature measurement systems
- Geomagnetic surveys
- Magnetic field cross-calibration

Product Identification

Product name	Package	Noise	Range in µT
Mag-13	MS = Square section MC = Cylindrical MCD = Cylindrical, deep submersible U = Unpackaged	L = Low noise Q = Very low noise Z = Ultra low noise*	±60 ±100

* Available in ±100µT range and square section enclosure only.

Example: Mag-13MCL100 is a low noise 100µT sensor in a cylindrical enclosure.

Mag-13 Specifications

Performance			
Noise levels	**L**	**Q**	**Z**
Number of axes	Three		
Polarity	+ve non-inverting output when pointing North		
Measuring ranges	±60µT ±100µT		±100µT
Bandwidth (-3dB)	3kHz		
Roll-off	-11dB/octave		
Measurement noise floor	<6pTrms/√Hz at 1Hz	<5pTrms/√Hz at 1Hz	<4pTrms/√Hz at 1Hz
Start-up time	150 ms		
Warm-up time	15 min to meet specifications for scaling <60min to meet noise specification		
Orthogonality error between axes	Less than ±0.1°		
Alignment error (Z axis to reference face)	Less than ±0.1° (Mag-13MS only)		
Linearity error	0.0015% (least squares fit)		
Frequency response	DC to 1kHz ±5%		
Hysteresis	<2nT (1 x full scale, when powered)		
Overload hysteresis	<2nT (2 x full scale, when powered)		
Excitation breakthrough	< 5 mV pk-pk at 16kHz		

Scaling Dependent Performance Parameters		
Measuring range (µT)	**±60**	**±100**
Scaling (mV/µT)	166	100
Calibration error	±0.5%	
Temperature coefficient of scaling max. / °C	±20 ppm	
Maximum offset error in zero field (nT)	±50 (8.3mV)	±50 (5mV)
Temperature coefficient of offset (nT/°C)	±0.3nT (10µV/°C)	

Environmental				
Package options	**Cylindrical (MC)**	**Square (MS)**	**Cylindrical Deep Submersible (MCD)**	**Unpackaged (U)**
Operational temperature range	-40 to +70°C			
Storage temperature range	-40 to +85°C			
Humidity	Up to 90%, non condensing			
Environmental protection / sealing	IP67		IP68 (5000m)	n/a

Mechanical				
Package options	**Cylindrical (MC)**	**Square (MS)**	**Cylindrical Deep Submersible (MCD)**	**Unpackaged (U)**
Enclosure dimensions	Ø 25 x 225mm	32 x 32 x 225mm	Ø 60 x 286mm	19.5 x 149mm
Weight	83g	227g	950g	26g
Enclosure materials	PEEK	Acetal	PEEK	n/a
Connector	Fischer DEU1031 A010-SR-11-11-G-12		Impulse XSJ-10-BCR (dry mateable)	Molex 53047-0810
Mating connector	Fischer S1031 A010-SR-11-11 with E3-1031.2/6.2		Impulse XSJ-10-CCP (dry mateable)	Molex Picoblade 51021-0800 and crimp terminal 50079-8000 with wire 26-28 AWG recommended
Mean Time Before Failure (MIL217F)	Target 12 years			
Fixing points	1 x M5 with 3 points	2 x M5	None	2 x M2

Electrical	
Supply voltage	±12 to 17V
Current consumption	+65mA, -30mA ±1.4mA/100µT (typical)
Analogue output	±10V single-ended (0V = zero-field)
Output impedance	10Ω
Maximum load capacitance	>1µF
Maximum cable length	0.5km (with a minimum of ±12V supplied to the magnetometer)

Temperature Sensor	
Measurement range	-40 to + 85°C, subject to operational range stated above
Output type	Voltage
Offset	3.5V at 0°C
Scaling	-10mV/°C
Accuracy	±4°C (over operating range), ±3°C at 25°C

Mating Connectors

Mating connectors for Mag-13MCD must be purchased separately. Connectors are supplied free of charge for all other models.

Cables

The standard cable length is 5m; alternative lengths are available. Please contact Bartington Instruments for further information.

All cables are terminated with a Hirose RM15TPD10S, suitable for connection to Bartington Instruments' range of data acquisition and power supply units.

Compatibility

The Mag-13 range is compatible with the following data acquisition and power supply units from Bartington Instruments:

- PSU1 Power Supply Unit
- Magmeter / Magmeter-2 Power Supply and Display Unit
- Spectramag-6 Data Acquisition Unit (adaptor cable required)
- SCU1 Signal Conditioning Unit
- Mag-03DAM Data Acquisition Module (adaptor cable required)
- Decaport Analogue Interface Module
- DAS1 Data Acquisition System
- DecaPSU Power Supply Unit

[Outputs for the test coil and temperature sensor are presently only available with the DecaPSU.]

Mounting Accessories

A range of mounting accessories are available:

Specification	
Mag-BR	Mounting bracket for use with the Mag-13MC
Mag-T	Tripod
Mag-TA	Universal tripod adaptor
Mag-LP	Levelling platform; can be mounted on the Mag-T tripod or Mag-MR rack; compatible with Mag-TA
Mag-MR	Mounting rack for the installation of Mag-LP platforms, available in lengths of 1 metre and multiples