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Mag-03®

Three-Axis Magnetic Field Sensors



bartington.com

Bartington® Instruments



Mag-03® Three-Axis Magnetic Field Sensors

These compact, high performance fluxgate sensors with integral electronics provide precision measurements of static and alternating magnetic fields in three axes. They are available in a variety of enclosures. Powered from any ±12V supply, outputs are in the form of three analogue voltages from 0 to ±10V, proportional to Bx, By and Bz.

The sensors have a very wide range of applications in physics, bioelectromagnetics, geophysical exploration, and defence.

A range of power supply and data acquisition units are available.



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Features

- Cylindrical, square section, unpackaged and two-part
- Noise levels down to ≤10pTrms/√Hz at 1Hz
- Measuring ranges from ±70µT to ±1000µT
- Bandwidth to 3kHz

Typical Applications

- Magnetic field monitoring
- Use as feedback sensors in active magnetic field shielding systems
- Site surveys prior to MRI or Electron Microscope installation
- Electromagnetic surveys
- Aeromagnetic surveys
- Magnetic signature ranges



Product Identification

Product name	Package	Noise specification	Range in µT
Mag-03	MC= Cylindrical MCES = Cylindrical, environmentally sealed MCFL = Cylindrical, connections via flying leads MCUP = Cylindrical, unpackaged MCT = Cylindrical with titanium enclosure MCTP = Cylindrical, two-part construction MSES = Square section, environmentally sealed IE = Independent elements IEHV = Independent elements, for use in a high vacuum chamber	Standard = no letter	±70 ±100 ±250 ±500 ±1000

Example: Mag-03MC100 is a standard noise sensor with a range of ±100µT.

Note: For some Mag-03 magnetometers (Mag-03 MCFL, MCTP, MCUP, IE), lead lengths must be specified and this length is included in the product identification. For example, Mag-03MCFL250-1000 is a Mag-03MCFL with a range of 250µT and flying leads of 1000mm.



Mag-03® Specifications

Performance	
Number of axes	Three
Polarity	+ve non-inverting output when pointing North
Bandwidth (-3dB)	3kHz
Measurement noise floor: standard version	≤10pTrms/√Hz at 1Hz
Scaling error	<±0.5%
Orthogonality error	<0.5° (<0.1 for Mag-03MSES only)
Alignment error (Z axis to reference face)	<0.1° (Mag-03MSES only)
Single sensor axis to body	<3.5° (Mag-03IE sensors only)
Linearity error	<0.0015%
Frequency response	0 to 1kHz maximally flat, ±5% maximum at 1kHz
Excitation breakthrough	<20mV pk-pk at 15.625kHz typical (3kHz bandwidth) <400mV pk-pk at 15.625kHz typical (5kHz bandwidth)

Scaling Dependent Parameters					
Measuring range (µT)	±70	±100	±250	±500	±1000
Scaling (mV/µT)	143	100	40	20	10
Scaling temperature coefficient (ppm/°C)	±15	±20	±50	±100	±200
Offset in zero field (nT)	±5	±5	±12	±25	±50
Offset temperature coefficient (nT/°C)	±0.1	±0.1	±0.2	±0.33	±0.6

Environmental and Mechanical	Mag-03MC	Mag-03MCFL
Operating temperature range:	-20°C to +70°C	-20°C to +70°C
Environmental protection	IP51	IP51
Dimensions (ø x L)	25 x 202mm	25 x 211mm
Weight	85g	80g
Enclosure material	Reinforced epoxy	Reinforced epoxy
Connector	Hirose RM15TRD10P	Flying leads (7x0.22mm^2) 500mm length (Up to 5000mm length to order)
Mating connector	Hirose RM15TPD10S	
Mounting	Mounting bracket or tripod adaptor available	Mounting bracket or tripod adaptor available

Environmental and Mechanical	Mag-03MCTP	Mag-03MCT
Operating temperature range:	-20°C to +70°C	-20°C to +70°C
Environmental protection	IP51	IP51
Dimensions (mm)	Electronics: ø25 x 115 length Sensor: ø20 x 54 length Sensor-electronics cable: 1000 length (up to 5000 length to order)	25 x 202mm
Weight	80g	95g
Enclosure material	Sensor: reinforced epoxy Electronics: aluminium alloy	Titanium
Connector	Hirose RM15TRD10P	Hirose RM15TRD10P
Mating connector	Hirose RM15TPD10S	Hirose RM15TPD10S
Mounting	Mounting bracket for electronics enclosure, or tripod adaptor available	Mounting bracket for electronics enclosure, or tripod adaptor available

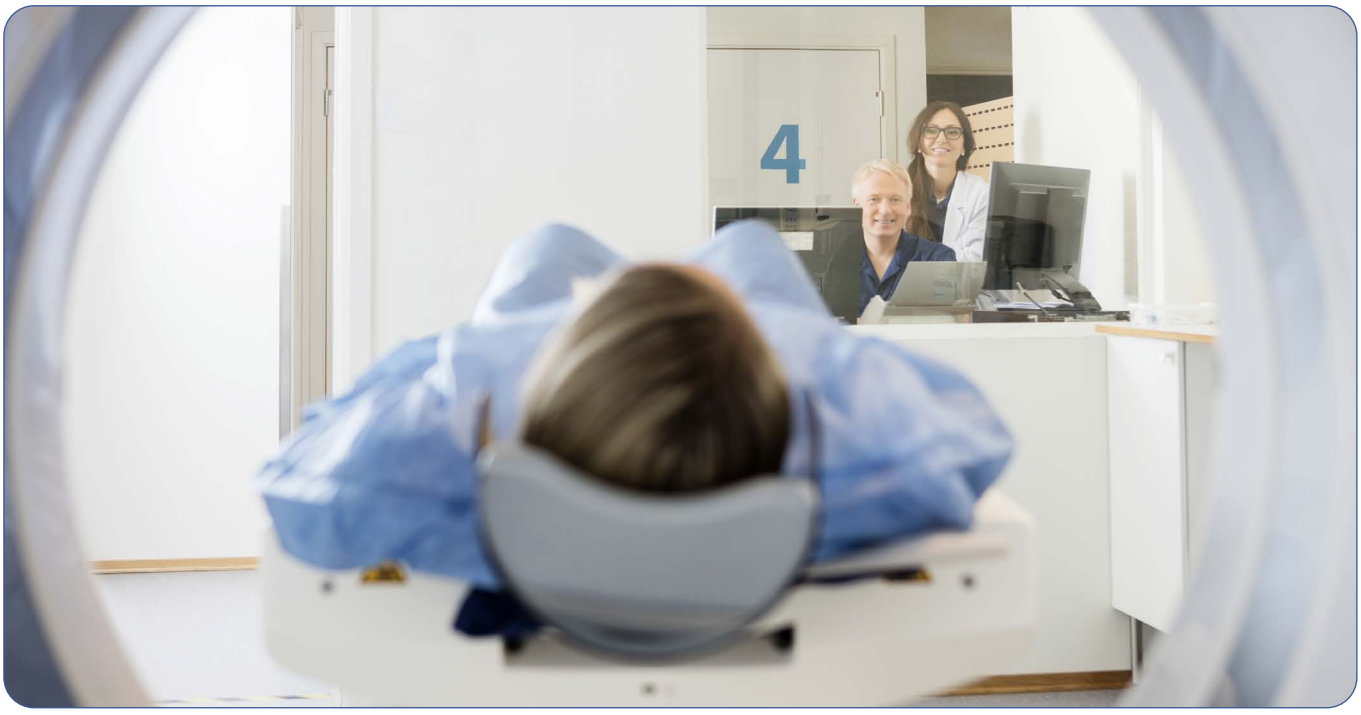
Environmental and Mechanical	Mag-03IE	Mag-03IEHV
Operating temperature range:	-20°C to +70°C	-20°C to +70°C
Environmental protection	IP51	For use in high vacuum chambers
Dimensions (mm)	Electronics: ø25 x 115 length Sensor: ø8 x 30 length Sensor-electronics cable: 750 length (up to 5000 length to order)	Electronics: ø25 x 115 length Sensor: ø6.5 x 30 length Inner cable: 1100 length (up to 5000 length to order) Outer cable: 140 length Inner and outer cable joined by re-solderable terminal block
Weight	80g	80g
Enclosure material	Sensors: alumina cylinder Electronics: aluminium alloy	Sensors: glass tube with epoxy filling Electronics: aluminium alloy
Connector	Hirose RM15TRD10P	Hirose RM15TRD10P
Mating connector	Hirose RM15TPD10S	Hirose RM15TPD10S
Mounting	Mounting bracket or tripod adaptor available	Mounting bracket or tripod adaptor available

Environmental and Mechanical	MCES	MSES
Operating temperature range:	-20°C to +70°C	-20°C to +70°C
Environmental protection	IP64	IP64
Dimensions (mm)	25 x 207mm	32 x 32 x 166
Weight	100g	160g
Enclosure material	Reinforced epoxy	Reinforced epoxy
Connector	Amphenol 62GB-51T10-7P	Amphenol 62GB-12E10-7P
Mating connector	Amphenol 62GB-16J10-7S	Amphenol 62GB-16J10-7S*
Mounting	Mounting bracket or tripod adaptor available	Mounting bracket or tripod adaptor available

* Modified to be non-magnetic.

Environmental and Mechanical	Mag-03MCUP
Operating temperature range:	-20°C to +70°C
Environmental protection	Unpackaged conformal coating
Dimensions (mm)	Electronics: 21 x 12 x 12 (W x D x H) Sensor: ø20.9 x 56 length Sensor-electronics cable: 610 length (up to 5000 length to order)
Weight	80g
Enclosure material	Sensor: reinforced epoxy Electronics: conformal coating
Connector	Flying leads 500mm length (up to 5000mm length to order)*
Mating connector	
Mounting	

* Mag-03MCUP NS1 option with solder pads



Electrical	
Supply voltage	±12V to ±17V DC
Current consumption	+30mA, -10mA (+1.4mA per 100µT for each axis)
Power supply rejection ratio	5µV/V (-106dB)
Analogue output	±10V (±12V supply) (unbalanced, single ended ref. 0V)*
Output impedance	10 Ω

* With an external load of 10kΩ the maximum output voltage will be less than the supply voltage by the value given in the table below. All parameters, other than the output voltage range, remain unaffected for supply voltage (V_s) changes in the range from ±8 to ±15V.

Nominal range (µT)	100	250	500	1000
Output swing	V_s - 0.5	V_s - 0.7	V_s - 0.8	V_s - 1.0

Mating Connectors

Mating connectors for all Mag-03 sensors are provided free of charge.

Cables

The standard cable length is 5m; other lengths up to 600m can be supplied on request. All cables are terminated with a Hirose RM15TPD10S, suitable for connection to Bartington Instruments' range of data acquisition and power supply units.

Mag-03IE, Mag-03MC, Mag-03MCT, Mag-03MCTP	
Conductors	7/0.2 PVC insulated conductors, overall braided screen and PVC sheath
Type no.	7-2-8C Black to Def Stan 61-12, part 4
Conductor resistance	0.092Ω/m
Capacitance	100pF/m core to core 170pF/m core to screen

Compatibility

The Mag-03 range is compatible with the following data acquisition and power supply units from Bartington Instruments:

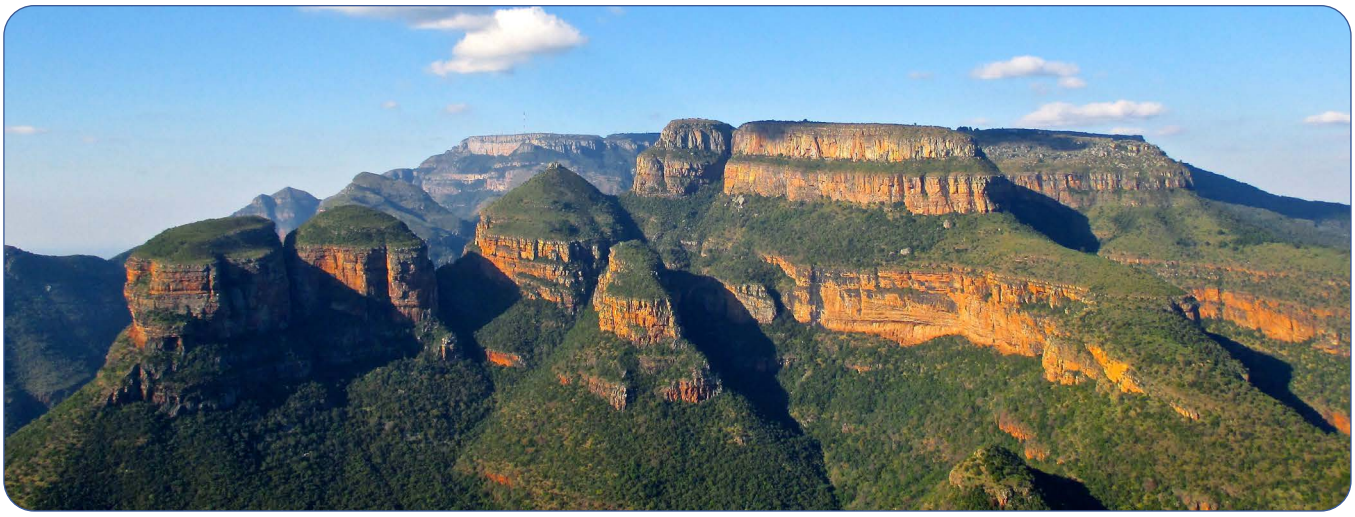
- PSU1 Power Supply Unit
- DecaPSU Power Supply Unit (adaptor cable required)
- Magmeter-2 Power Supply and Display Unit
- Spectramag-6 Data Acquisition Unit
- SCU1 Signal Conditioning Unit
- DAS1 Data Acquisition System
- Decaport Analogue Interface Module

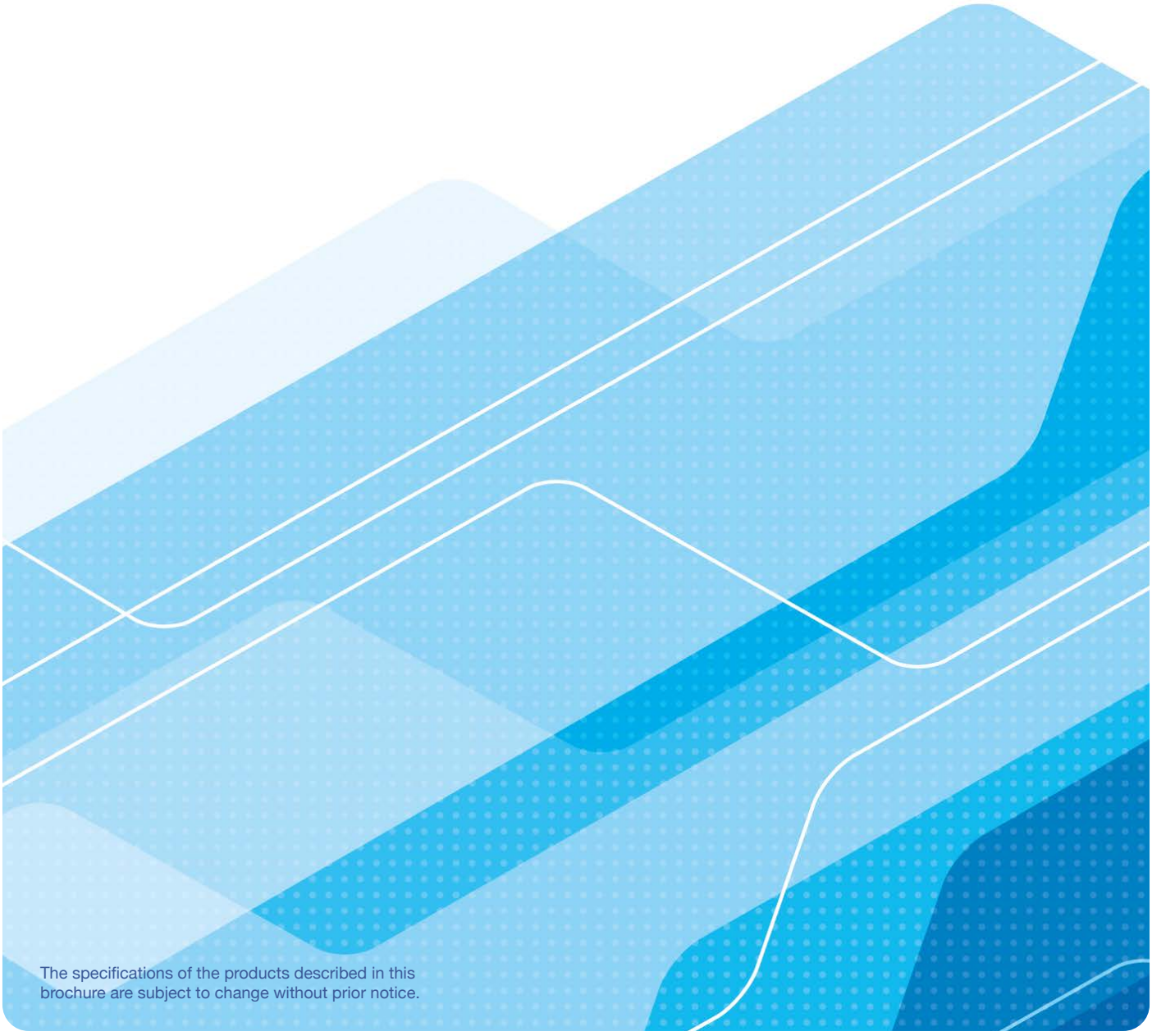
Mounting Accessories

A range of non-magnetic mounting accessories is available.

Specification	
Mag-BR	Mounting bracket for cylindrical sensors (supplied with mounting screws)
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

Sensor	Appropriate support	Notes
Mag-03MC Mag-03MCFL	Mag-BR mounting bracket. Mag-TA tripod adaptor	Bracket clamps around the cylindrical enclosure.
Mag-03IE	Mag-BR mounting bracket. Mag-TA tripod adaptor	Bracket clamps around the body of the sensor, not the sensor heads.
Models not listed	Customer must provide mounting support	





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

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