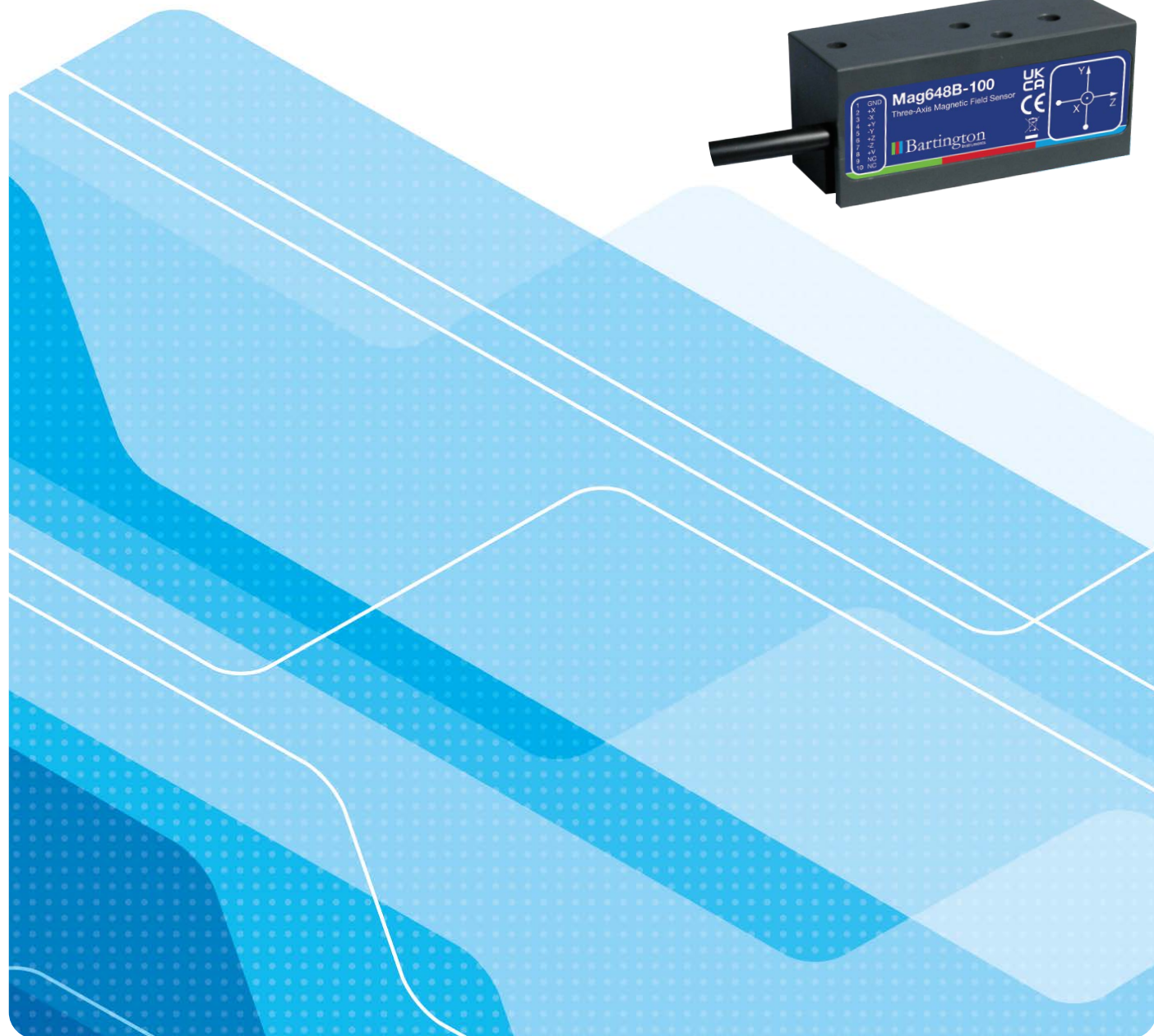
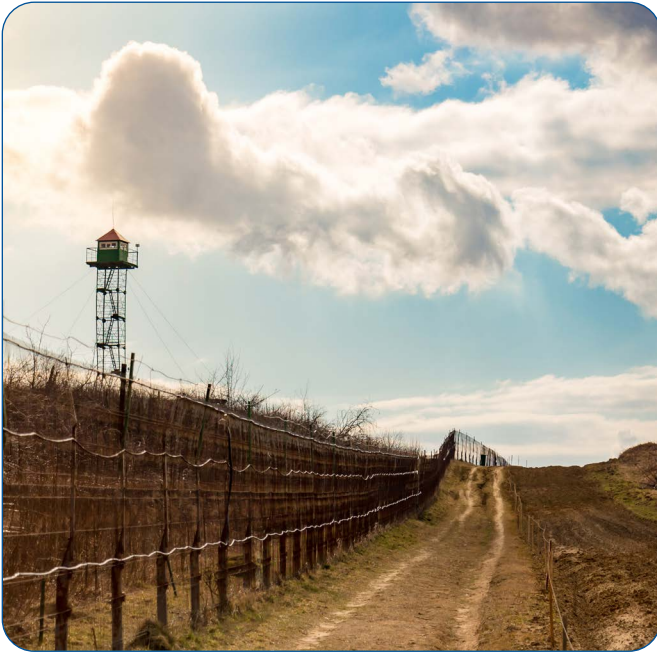


# Mag648 & Mag649®

Low Power Three-Axis  
Magnetic Field Sensors





## Mag648 and Mag649® Low Power Three-Axis Magnetic Field Sensors

These three-axis fluxgate sensors offer low noise magnetic field measurements from DC up to 1kHz. Their exceptionally low power consumption and compact size make them ideal for battery powered applications such as surveillance and perimeter security.

A submersible version is available, for operation to depths of 2000 metres. An unpackaged version is also available.



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Mag649 is a registered trade mark of Bartington Holdings Limited in the following territories: United Kingdom.

## Features

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- Low power: <15mW consumption
- Low noise version: <10pTrms/ $\sqrt{\text{Hz}}$  at 1Hz
- Bandwidth to 30Hz (Mag648) and 1kHz (Mag649®)
- Standard, submersible and unpackaged versions available
- Measuring range:  $\pm 60\mu\text{T}$  or  $\pm 100\mu\text{T}$

## Typical Applications

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- Incorporation in surveillance systems
- Magnetic field measurements in remote locations
- Multi-sensor magnetic signature ranges
- Vehicle monitoring



## Product Identification

Product name	Package	Noise	Range
Mag648 or Mag649	<i>No code</i> = Standard FL = Flying lead S = Submersible U = Unpackaged	B = Basic noise L = Low noise	60 = $\pm 60\mu\text{T}$ 100 = $\pm 100\mu\text{T}$ 200 = $\pm 200\mu\text{T}$ *

\* Applies to Mag649 only

Example: Mag649FLL100 is a 100 $\mu\text{T}$  low noise sensor with a flying lead.

## Specifications

Performance				
Number of axes		Three (right hand XYZ co-ordinate system)		
Polarity		+ve non-inverting output when pointing North		
Measuring range:	Mag648 Mag649®	$\pm 60\mu\text{T}$ $\pm 60\mu\text{T}$	$\pm 100\mu\text{T}$ $\pm 100\mu\text{T}$	$\pm 200\mu\text{T}$
Bandwidth (-3dB):	Mag648 Mag649®	>30Hz >1kHz		
Measurement noise floor:	Mag649L Mag648B/Mag649B	$\leq 10\text{pTrms}/\sqrt{\text{Hz}}$ at 1Hz >10pT to $\leq 50\text{pTrms}/\sqrt{\text{Hz}}$ at 1Hz		
Scaling:	Mag648 Mag649®	50mV/ $\mu\text{T}$ 50mV/ $\mu\text{T}$	30mV/ $\mu\text{T}$ 30mV/ $\mu\text{T}$	15mV/ $\mu\text{T}$
		$\pm 3\text{V}/\mu\text{T}$		
Scaling temperature coefficient		100ppm/ $^{\circ}\text{C}$		
Start-up time		150ms		
Warm-up time		15mins		
Offset (in zero field)		$\pm 100\text{nT}$		
Offset temperature coefficient		1nT/ $^{\circ}\text{C}$		
Scaling error		$\pm 0.5\%$ at DC		
Orthogonality error		$< 1^{\circ}$		
Linearity error		0.0033% (least squares fit)		
Frequency response (<5% deviation from DC):	Mag648 Mag649®	DC to 5Hz DC to 100Hz		
Hysteresis		$< 2\text{nT}$ at 1 x full scale (when powered)		
Excitation breakthrough:	Mag648 Mag649®	$< 10\text{mV}$ pk-pk at 4.096kHz typical $< 20\text{mV}$ pk-pk at 8.192kHz typical		



Environmental	Mag648 Mag649®	Mag648FL Mag649FL	Mag648S Mag649S	Mag648U Mag649U
Operating temperature range	-40°C to +70°C			
Storage temperature range	-40°C to +60°C			
Environmental protection	IP67	Enclosure IP67; connector none	IP68 - 2000m depth	N/A
Humidity	Up to 90%, non-condensing (unpackaged version)			
Compliance	EMC BS EN 61326:2013 & RoHS			

Mechanical	Mag648 Mag649®	Mag648FL Mag649FL	Mag648S Mag649S	Mag648U Mag649U
Dimensions (excl. cable) (W x H x L)	30 x 32 x 70mm		40 x 40 x 141mm	29 x 23 x 66mm
Interconnecting cable length	200mm (incl connector)		N/A	
Weight (approximate)	120g		330g	200g
Enclosure material	Black acetal filled with polyurethane resin UR5097		Black Acetal	N/A
Connector	Binder 99 9125 00 08	Flying leads 8x0.22mm <sup>2</sup>	SubConn MCBH10FNM	Molex 53047-1010
Mating connector	Binder 99 9126 00 08	N/A	SubConn MCOM10M	Molex 51021-1000 + contacts
Cable bending radius	41mm		110mm	N/A
Mounting	3 x ø4.5mm holes		2 x ø4.5mm holes	Single hole M2.5

Electrical	
Supply voltage	+3.5V to +15V DC
Current consumption: Mag648 (basic noise) Mag649® (basic noise) Mag649® (low noise & ±200µT)	3.2mA (in zero field), +0.55mA/100µT per axis 2.8mA (in zero field), +0.55mA/100µT per axis 5.4mA (in zero field), +0.55mA/100µT per axis
Power-on surge	400mA maximum
Analogue outputs	±3V (balanced differential, each output 0.15V to 3.15V, 1.65V zero-field)
Output impedance	20Ω typical
Maximum load capacitance: Mag648 Mag649®	>10µF bandwidth reduces when load capacitance >1µF
Maximum cable length	1.5km (must achieve 3.5V at supply voltage pin of Mag648/649)
Cable resistivity: Mag648 Mag649® Mag648-FL/Mag649-FL Mag648S/Mag649S	92Ω/km 92Ω/km 39Ω/km

Outline drawings of these sensors are available on their product page on the Bartington Instruments website.

## Power Supplies

The Mag648/649 range is compatible with the following data acquisition and power supply units from Bartington Instruments:

- PSU1 Power Supply Unit
- DecaPSU Power Supply Unit
- Decaport Analogue Interface Unit
- Magmeter-2 Power Supply and Display Unit
- SCU1 Signal Conditioning Unit
- DAS1 Data Acquisition System



## Accessories

	Mag648 & Mag649	Mag648FL & Mag649FL	Mag648S & Mag649S	Mag648U & Mag649U
Cables	Optional extra	N/A	Optional extra	
Mating connectors	Free of charge	N/A	Optional extra	Not supplied
Mounting	Mounting plate for mounting on Tripod Adaptor [optional extra]		N/A	



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

Bartington Instruments Ltd  
5, 8, 10, 11 & 12 Thorney Leys Business Park  
Witney, Oxford OX28 4GE. England

**Telephone:** +44 (0)1993 706565  
**Email:** sales@bartington.com

 **Bartington**<sup>®</sup>  
Instruments