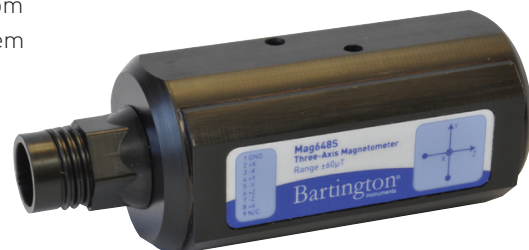


# Mag648 and Mag649

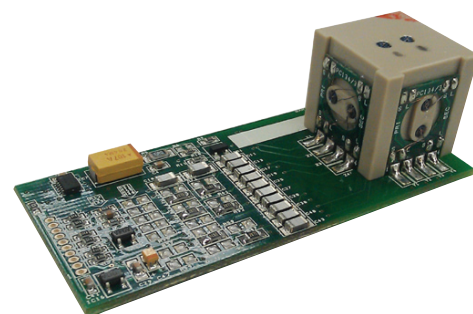
## Low Power Three-Axis Magnetic Field Sensors

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



### Features

- Bandwidth to 30Hz (Mag648) and 1kHz (Mag649)
- Standard, submersible and unpackaged versions available
- Low power: <15mW consumption
- Low noise version: <10pTrms/√Hz at 1Hz
- Measuring range: ±60µT or ±100µT



### Typical Applications

- Vehicle monitoring
- Perimeter surveillance
- Magnetic field measurement in remote locations
- Multi-sensor magnetic signature ranges

### Product Identification

Product name	Package	Noise	Range
Mag648 or Mag649	<i>No code</i> = Standard MX = Molex connector FL = Flying lead S = Submersible U = Unpackaged	<i>No code</i> = Standard noise L = Low noise	60 = 60µT 100 = 100µT

Example: Mag648-MXL100 is a low noise 100µT sensor with a Molex connector.

# Mag648 and Mag649 Specifications

Performance	
Number of axes	Three (Right Hand XYZ co-ordinate system)
Polarity	+ve non-inverting output when pointing North
Measuring range	$\pm 60\mu\text{T}$ or $\pm 100\mu\text{T}$
Bandwidth at -3dB: Mag648 Mag649	>30Hz >1kHz
Measurement noise floor: low noise standard noise	$\leq 10\text{pTrms/VHz}$ at 1Hz >10 to $\leq 20\text{pTrms/VHz}$ at 1Hz
Scaling	50mV/ $\mu\text{T}$ (60 $\mu\text{T}$ ) or 30mV/ $\mu\text{T}$ (100 $\mu\text{T}$ )
Start-up time	150ms
Warm-up time	15mins
Offset error	$\pm 100\text{nT}$ in zero field
Scaling error	$\pm 0.5\%$ at DC
Temperature coefficient of offset error	1nT/ $^{\circ}\text{C}$
Temperature coefficient of scale factor	100ppm/ $^{\circ}\text{C}$
Orthogonality error	Less than 1° error between axes
Linearity error	0.0033% (least squares fit)
Frequency response (<5% deviation from DC): Mag648 Mag649	DC to 5Hz DC to 100Hz
Hysteresis	<2nT at 1 x full scale (when powered)
Excitation breakthrough: Mag648 Mag649	<10mV pk-pk at 4kHz <10mV pk-pk at 8kHz
MTBF	~21 years per MIL-217F-2(GB)

Environmental	
Operating temperature range	-40 $^{\circ}\text{C}$ to +70 $^{\circ}\text{C}$
Storage temperature range	-40 $^{\circ}\text{C}$ to +85 $^{\circ}\text{C}$
Environmental protection: Mag648/649 Mag648-MX & FL/Mag649-MX & FL Mag648S/Mag649S	IP67 enclosure IP67; connector none IP68 (2000m depth)

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

### Mechanical

	<b>Mag648 Mag649</b>	<b>Mag648-MX Mag649-MX</b>	<b>Mag648FL Mag649FL</b>	<b>Mag648S Mag649S</b>	<b>Mag648U Mag649U</b>
Dimensions (excl. cable) (W x H x L)	30 x 32 x 70mm			40 x 40 x 115mm	29 x 23 x 66mm
Interconnecting cable length	200mm	135mm	500mm	N/A	
Weight (approximate)	120g			300g	20g
Enclosure material	Black acetal filled with polyurethane resin UR5097			Acetal	N/A
Connector	Binder 99 9125 00 08	Molex 22-04-1103	N/A	Impulse XSJ-9-BCR	Molex 53047-1010
Mating connector	Binder 99 9126 00 08	Molex 22-04-1101	N/A	XSJ-9-CCP	Molex 51021-1000 + contacts
Cable bending radius	41mm			110mm	N/A
Mounting	3 x $\varnothing$ 4.5mm holes			2 x $\varnothing$ 4.5mm holes	Single hole M2.5

### Electrical

Supply voltage	+3.5V to 15V
Current consumption: Mag648 Mag649 (standard noise) Mag649 (low noise)	3.3mA (typical earth field), 4mA max. 2.6mA (typical earth field), 3mA max 5.5mA (typical earth field), 5.8mA max.
Power-on surge	400mA maximum
Analogue outputs – full-scale voltages	$\pm$ 3V (balanced differential, each output 0.15V to 3.15V, 1.65V zero-field)
Output impedance	20 $\Omega$ typical
Maximum load capacitance: Mag648 Mag649	> 10 $\mu$ F bandwidth reduces when load capacitance > 1 $\mu$ F
Maximum cable length	1.5km (must achieve 3.5V at supply voltage pin of Mag648/649)
Cable resistivity: Mag648/649 Mag648-MX & FL/Mag649-MX & FL Mag648S/Mag649S	92 $\Omega$ /km 92 $\Omega$ /km 39 $\Omega$ /km

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

# Compatibility

The Mag648 and Mag649 are compatible with the following data acquisition and power supply units from Bartington Instruments:

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

# Accessories

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