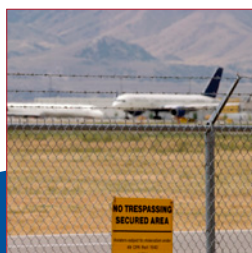


Mag648 and Mag649

World leaders in high precision magnetic field measurements

Mag648 and Mag649

Low Power Three-Axis Magnetic Field Sensors



Bartington®
Instruments

Mag648 and Mag649

Low Power Three-Axis Magnetic Field Sensors

The Mag648 and Mag649 series of three-axis fluxgate sensors offer low noise magnetic field measurements together with exceptionally low power consumption. Their compact size and battery powered operation make these sensors ideal for surveillance and perimeter security applications.

Features and options

- Bandwidth to 30Hz (Mag648) and 1kHz (Mag649)
- Standard, submersible (to 2000m) and unpackaged versions available
- Low power: 15mW consumption
- Compact dimensions: 70 x 30 x 32mm (standard)
- Low noise option: $<10\text{pT}/\sqrt{\text{Hz}}$ at 1Hz (Mag648 only)
- Range: $\pm 60\mu\text{T}$ or $\pm 100\mu\text{T}$

Typical applications

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



Mag648 and Mag649 Specification

Performance

Number of axes	Three
Range	$\pm 60\mu\text{T}$ or $\pm 100\mu\text{T}$
Bandwidth at -3dB: Mag648 Mag649	>30Hz >1kHz
Internal noise: low noise (Mag648 only) standard noise	$\leq 10\text{pTrms}/\sqrt{\text{Hz}}$ at 1Hz Between 10 and 20pTrms/ $\sqrt{\text{Hz}}$ at 1Hz
Differential output scale factor	50mV/ μT (60 μT) or 30mV/ μT (100 μT)
Start-up time	150ms
Warm-up time	15mins
Offset error	$\pm 100\text{nT}$ in zero field
Scaling error	$\pm 0.5\%$ at 35Hz or less
Temperature coefficient of offset error	1nT/ $^{\circ}\text{C}$
Temperature coefficient of scale factor	100ppm/ $^{\circ}\text{C}$
Orthogonality error	Better than $\pm 0.5^{\circ}$
Linearity error	0.0033% of full scale at any point
Hysteresis	<2nT at full scale (when powered)
Excitation breakthrough: Mag648 Mag649	<10mV p-p <20mV p-p
MTBF	~ 12 years

Environmental

Operating temperature range	-40 $^{\circ}\text{C}$ to +70 $^{\circ}\text{C}$
Storage temperature range	-55 $^{\circ}\text{C}$ to +125 $^{\circ}\text{C}$
Environmental protection: Mag648/649 Mag648-MX & FL/Mag649-MX & FL Mag648S/Mag649S	IP67 IP67 (sensor only) IP68 (2000m)

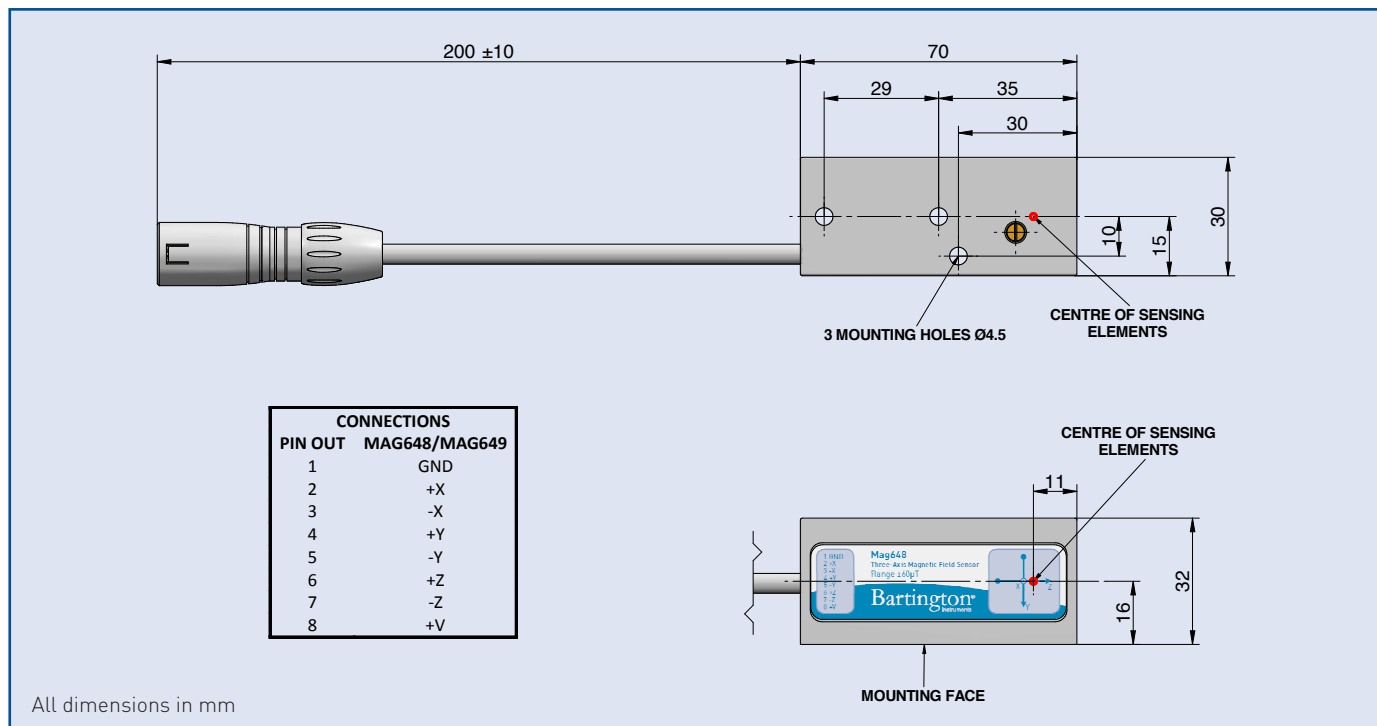
Mechanical

	Mag648 Mag649	Mag648-MX Mag649-MX	Mag648FL Mag649FL	Mag648S Mag649S	Mag648U Mag649U
Dimensions excl. cable	70 x 30 x 32mm	70 x 30 x 32mm	70 x 30 x 32mm	92.5 x ϕ 45mm	66 x 29 x 23mm
Interconnecting cable length	150mm	150mm	150mm	N/A	N/A
Weight (approximate)	120g	120g	120g	300g	70g
Enclosure material	Black acetal filled with polyurethane resin UR5097				N/A
Connector	Binder-99 9125 00 08-Plug, FREE, 8 Way (Mating: Binder-99 9126 00 08)-Socket, FREE, 8 Way	Molex 22-04-1101	N/A	Teledyne Impulse XSJ-9-CCP	Molex picoblade 53047-1010
Cable bending radius	41mm	41mm	41mm	110mm	N/A
Mounting	3 x ϕ 4.5mm holes	3 x ϕ 4.5mm holes	3 x ϕ 4.5mm holes	2 x ϕ 4.5mm holes	Single hole

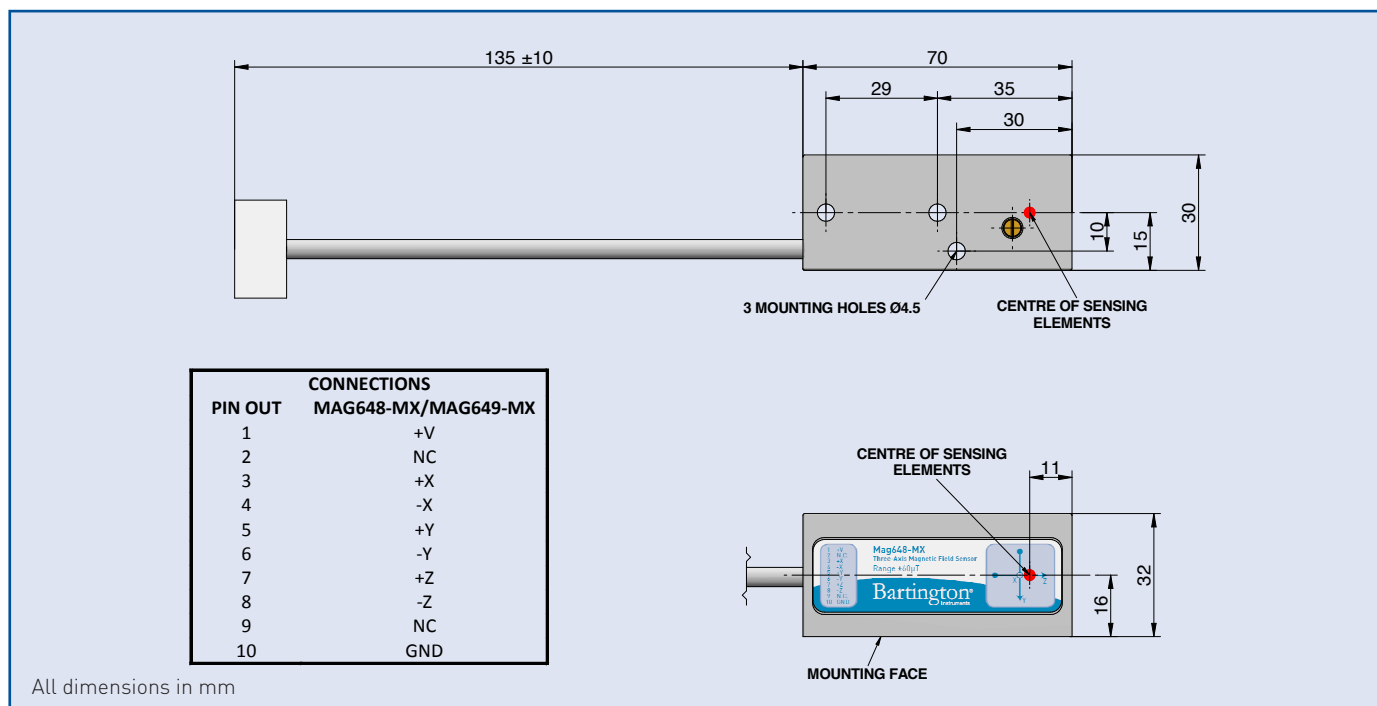
Electrical

Voltage input	+3.5V to 15V
Current consumption	4.2mA (typical)
Power-on surge	400mA maximum
Analog output	$\pm 3\text{V}$ (differential, each output 0.15V to 3.15V, 1.65V zero-field)
Output impedance	10 Ω
Maximum load capacitance	Greater than 10uF
Maximum cable length	1.5km (with >3.5V at connector power pins)
Cable resistivity: Mag648/649 Mag648-MX & FL/Mag649-MX & FL Mag648S/Mag649S	92 Ω /km 92 Ω /km 39 Ω /km

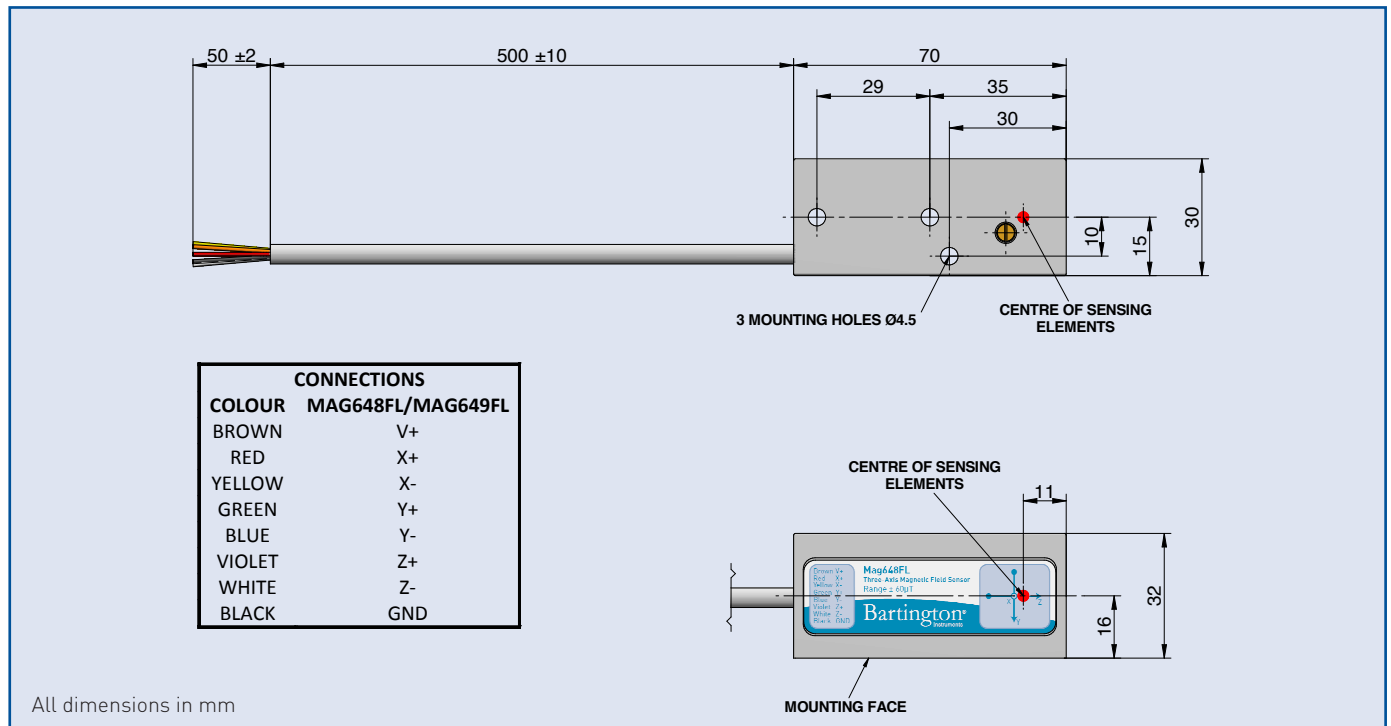
Mag648 and Mag649 Outline Drawing



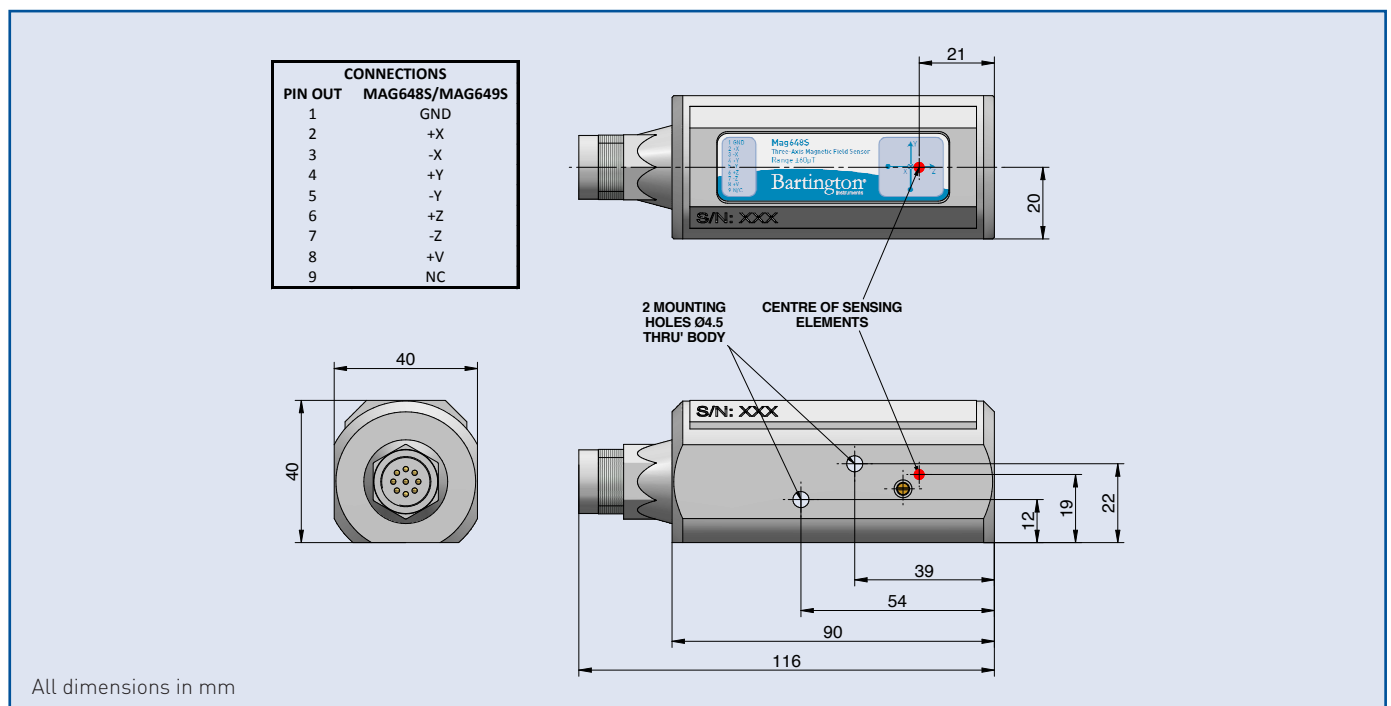
Mag648-MX and Mag649-MX Outline Drawing



Mag648FL and Mag649FL Outline Drawing



Mag648S and Mag649S Outline Drawing



Accessories

	Mag648 & Mag649	Mag648-MX & Mag649-MX	Mag648FL & Mag649FL	Mag648S & Mag649S	Mag648U & Mag649U
Cables	Optional extra	Optional extra	Optional extra	Optional extra	Optional extra
Mating connectors	Free of charge	Not supplied	N/A	Optional extra	Not supplied

Product compatibility

- PSU1 Power Supply Unit
- Magmeter
- SCU1 Signal Conditioning Unit
- Decaport Analog Interface Module
- DAS1 Data Acquisition System

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 = 60 μ T 100 = 100 μ T

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