

Operation Manual for Mag670 Single Axis Magnetic Field Sensor



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1. About this Manual

This manual provides the information necessary to help customers connect, install and operate, the Mag670 magnetic field sensor.

Technical specifications of the products, including power supply requirements and analogue output details, can be found in [DS2497](#), whilst outline drawings of both sensor head, electronics board and cable can be found on [DR2545](#).

1.1. Symbols Glossary

The following symbols used within this manual call your attention to specific types of information:



WARNING: Indicates a situation in which serious bodily injury or death could result if the warning is ignored.



Caution: Indicates a situation in which bodily injury or damage to your instrument, or both, could result if the caution is ignored.



Indicates a situation in which ESD protection should be used.



Identifies items that must be disposed of safely to prevent unnecessary damage to the environment.

Note: A paragraph in this format provides useful supporting information on how to make better use of your purchase.

2. Safe Use



WARNING: These products are not qualified for use in explosive atmospheres or life support systems. Consult Bartington Instruments for advice.



WARNING: Environmental and electrical specifications should not be exceeded.



To prevent irreparable damage, electrostatic discharge (ESD) protection and precautions must be used when handling the unpackaged sensor electronics board.

Note: Do not expose to strong magnetic fields while being stored as this can magnetise the sensor and affect its offset performance.

3. Introduction to the Mag670

The Mag670 is a single-axis fluxgate sensor that provides highly linear magnetic response and low hysteresis. Each instrument consists of a single, feedback-stabilised, fluxgate sensing element arranged along the length of the enclosure, which is orientated to point away from the unit's connector.

The sensor has no power supply or data processing abilities of its own and must always be connected to a power supply to be able to function.

Regulating the power supply internally ensures that the Mag670 is suitable for battery-powered operation, over both long and short cables.

Packaged and unpackaged versions are available.

4. Installing the Mag670

4.1. Siting the Sensor (Environment Recommendations)

Note: Site the sensor several metres from any magnetic base rock to avoid compromising measurements.

Note: Site the sensor several tens of metres from very large ferromagnetic objects that could create fields exceeding the measuring range of the sensor.

Note: Avoid siting the sensor near any ferromagnetic objects that may be subjected to the effects of magnetic hysteresis, which would affect the sensor in an unpredictable manner.

Note: Conduct a magnetic evaluation of any proposed installation site to establish that it is free from magnetic contaminants. Carry out such an evaluation using total field or resonance sensors.

4.2. Cable Recommendations

Note: The connecting cable to the sensor should be a five-core screened cable. Two cores will be used for positive and negative power supply lines, one core for output signal, one core for signal common, and one for power supply ground. The screen should be connected to supply ground at the supply end only. The capacitance between cores should be less than 200pF per metre.

Note: Pin out values are shown in drawings DR2545 and DR2945.

Note: Leads are susceptible to electromagnetic interference and should be screened wherever possible.

Note: The length of the cable is limited by the voltage drop in the power supply lines and the capacitance between the cores. For this reason the cable should be limited to a maximum length of 600 metres.

Bartington Instruments can supply cables for connection of the sensor to the PSU1, Magmeter, SCU1 and Spectramag-6 data acquisition and power supply units.

4.3. Pre-Installation Tests

Prior to the installation of the system, the sensor, cable and power supply must be fully tested to ensure correct function as follows:



Caution: Take care to avoid bending or otherwise damaging the contacts whilst conducting the tests.

1. Test the cables for continuity (using an electrical continuity tester or ohmmeter).
 - a. Test the cables end to end at the connectors, to ensure that the correct pins have been allocated to the conductors and that there are no open or high resistance circuits.

Note: Cable resistance will vary: refer to the product brochure for the expected values.

- b. Test the cables at the connectors to ensure that there are no short circuits between the conductors.
2. Check the power supply output voltage using a voltmeter. Refer to the product brochure for the expected values.
3. Connect the sensor to the cable connector.
4. Connect the power supply to the other cable connector.

4.4. Mounting Recommendations

Each sensor in both packaged and unpackaged versions has a set of mounting holes to allow attachment to a stable base or fixture. Refer to drawings DR2545 and DR2945 for further information.

The sensor can also be mounted on the Bartington Instruments Mag-TA Universal Tripod Adaptor. See the product brochure for instructions on how to do this.

4.5. Post Installation Testing

1. Switch on the power supply and wait until the sensor has stabilised. Refer to the product brochure for warm-up times.
2. Confirm no magnetic objects are moving in the vicinity.
3. Check the output:
 - a. connect a voltmeter between output and GND;
 - b. whilst monitoring the voltmeter readings, align the sensor with the terrestrial field until the maximum voltage value is determined;
 - c. confirm that the measured reading approaches the local geomagnetic field value.

Note: Geomagnetic field values can be provided by your local magnetic observatory. A margin of error due to local disturbance should be taken into account.

Note: The outputs from the sensor should remain stable to within the quoted noise limits. Refer to the product brochure for the expected values.

5. Using the Mag670

5.1. Magnetic Hysteresis



Caution: Subjecting the sensor to fields in excess of 2 x the nominal range may cause inaccuracy in future measurements. Degaussing the sensor can reverse such an effect.

Note: The Mag670 is designed to have an extremely low magnetic hysteresis. However, Bartington Instruments recommends your sensor is not subjected to magnetic fields greater than their stated measuring range for extended periods as this could alter the DC offset. If this occurs, the offset will exhibit drift as it returns to its original offset specification.

5.2. Environmental Precautions

Refer to the product brochure for maximum environmental electrical and mechanical ratings.



Caution: Exceeding the maximum environmental ratings may cause irreparable damage to your sensor.

6. Troubleshooting

The sensor is unlikely to suffer any defects in normal use: no internal components are serviceable. The most likely causes of failure, and their solutions, are detailed in the following table.

In the event of any apparent malfunction beyond those described in the table below, please email service@bartington.com, or telephone the Bartington Instruments service team on +44 (0)1993 706565.

Causes of Failure	Solution
Power supply failure	Check the power, as detailed in Pre-Installation Tests .
Cables	Test the cables, as detailed in Pre-Installation Tests .
Power input	If no fault can be found in the power supply or cables, ensure the cable length is not too long, causing excessive voltage drop between the power supply and sensor. Refer to the specifications defined in the product brochure.
Sensor damage	Physical damage to the Mag670 cannot be repaired. Replace with a new unit. See Disposal .

7. Care and Maintenance

No servicing is normally required. No repair is possible. For further details refer to [Troubleshooting](#).

7.1. Cleaning Mag670 Sensors



Caution: To clean an unenclosed variant of the Mag670, use an air duster to blow out dust and debris if required. Use appropriate personal protective equipment, such as eye protection, when carrying out this task.



Caution: Avoid using chemicals, such as solvents, when cleaning the Mag670. Use a damp cloth to remove grime from enclosures (packaged version only).



Caution: Take particular care when cleaning around electrical connections. Bent or damaged pins may cause the sensor to malfunction. The pins should **ONLY** be cleaned gently using a soft material dipped in Isopropanol (IPA). Avoid any contact with the rest of the sensor as this is likely to cause damage. Refer to the manufacturer's Material Safety Data Sheet (MSDS) for information on using this chemical safely.

7.2. Calibration

Return the Mag670 to Bartington Instruments for calibration at the recommended intervals. Refer to the Calibration Certificate for further details.

8. End of Life Disposal



This product (electrical and electronic equipment) should not be placed in municipal waste. Check local regulations for disposal of electronic products.

8.1. Waste Electrical and Electronic Equipment (WEEE) Regulations



This sensor complies fully with Restriction of the Use of Certain Hazardous Substances in Electrical and Electronic Equipment (RoHS) and WEEE Regulations current at the time of printing.

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