



# NATIONAL PHYSICAL LABORATORY

Teddington Middlesex UK TW11 0LW Telephone +44 20 8977 3222

## Certificate of Calibration



0478

**BARTINGTON SPECTRAMAG-6**  
Serial No. 116 with sensor  
Type Mag-03MC1000, Serial No. 2184

*This certificate is issued in accordance with the laboratory accreditation requirements of the United Kingdom Accreditation Service. It provides traceability of measurement to recognised national standards, and to units of measurement realised at the National Physical Laboratory or other recognised national standards laboratories. This certificate may not be reproduced other than in full, except with the prior written approval of the issuing laboratory.*

<b>FOR</b>	Bartington Instruments Ltd 5 & 10 Thorney Leys Business Park Witney Oxford OX28 4GE
<b>ORDER REFERENCE</b>	Order No. 17720, dated 2 March 2009
<b>DATE OF CALIBRATION</b>	11 – 12 March 2009
<b>MEASUREMENT NUMBER</b>	ED.09/09/16/EtM 80.233

The Mag-03MC1000 was connected to input 1 of the Spectramag-6, which was connected to a PC in accordance with the manufacturer's instructions. The Spectramag-6 output was monitored using the software supplied. The software version used was version 5.1.0.0. The following options were selected in the software:

Coupling:	DC
Display type:	Time domain
Display mode:	Offset to zero
Digital Filtering:	Low pass, 60 rolling points
Sensor gain:	1
Input 1 scaling:	1000 $\mu$ T / 10 V

The Mag-03MC1000 was positioned in a region of uniform magnetic field at the centre of a calibrated Helmholtz coil system. Each axis was, in turn, aligned so that it indicated the maximum value of magnetic flux density on the software's time domain graph. During the alignment, the two axis not being measured were aligned so that they indicated as close to zero as possible on the software's time domain graph.

**Reference: E09030158/1**

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**Date of Issue: 16 March 2009**

**Signed:** *Shaun Harmon* (Authorised Signatory)

**Checked by:** *SU. BT*

**Name:** S A C Harmon for Managing Director



*This certificate is consistent with the capabilities that are included in Appendix C of the MRA drawn up by the CIPM. Under the MRA, all participating institutes recognize the validity of each other's calibration and measurement certificates for the quantities, ranges and measurement uncertainties specified in Appendix C (for details see <http://www.bipm.org>).*

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Continuation Sheet

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The current in the Helmholtz coils was adjusted to produce a series of nominal magnetic flux densities. The reported values were obtained from the software's data files and the actual values of magnetic flux density were calculated from the measured currents.

The measurements were carried out at a temperature of  $20 \pm 1$  °C.

Corresponding software values and actual values of the magnetic flux density are given in the following tables.

Table 1: X Axis

Actual magnetic flux density ( $\mu$ T)	Speactramag software value ( $\mu$ T)
1000.0	997.4
750.0	748.0
500.0	498.6
250.0	249.3
- 250.0	- 249.3
- 500.0	- 498.6
- 750.0	- 748.0
- 1000.0	- 997.3

Table 2: Y Axis

Actual magnetic flux density ( $\mu$ T)	Speactramag software value ( $\mu$ T)
1000.0	994.2
750.0	745.7
500.0	497.1
250.0	248.5
- 250.0	- 248.5
- 500.0	- 497.1
- 750.0	- 745.7
- 1000.0	- 994.2

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Table 3: Z Axis

Actual magnetic flux density ( $\mu\text{T}$ )	Speactramag software value ( $\mu\text{T}$ )
1000.0	996.4
750.0	747.3
500.0	498.0
250.0	248.8
- 250.0	- 249.5
- 500.0	- 498.7
- 750.0	- 748.0
- 1000.0	- 997.1

The uncertainty in the measurements is estimated not to exceed  $\pm 0.25\%$ .

The reported expanded uncertainty is based on a standard uncertainty multiplied by a coverage factor of  $k = 2$ , which provides a level of confidence of approximately 95%. The uncertainty evaluations have been carried out in accordance with UKAS requirements. The quoted uncertainties apply only to the measured values and do not carry any implication as to the long-term stability of the instrument.

Reference: E09030158/1

Checked by: *SU. BT*

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