

MAGNETIC SHIELD



The following describes a mumetal shield to provide a very low magnetic field for measurements of remanent magnetism in small components and errors in magnetic sensors. The shield is a three layer cylinder with open ends for easy access. Guide rails and a suitable carrier are supplied to hold a *Mag-01* probe type B or D and provide a working surface to mount specimens under investigation.

The orientation of the major axis of the shield should be east/west to minimise the internal field. When placed in this orientation in an earth's field of 50,000 nT, the field in the centre of the shield can be expected to be typically 1nT transverse to the axis of the shield provided the shield has been fully de-gaussed and is not subjected to mechanical stress.

The shield should ideally be connected to system ground to provide electric-field shielding.

Shield details

Type	:	triple layer
Shielding material	:	mumetal
Seams	:	6 mm overlap
Ends	:	both open
Cylinder internal diameters	:	100 mm, 120 mm, 140 mm
Length of cylinders	:	300 mm (all cylinders equal)

External case

Material	:	anodised aluminium
Overall size (approximate)	:	221 mm x 221 mm x 310 mm
Weight	:	6.25kg

Method of Use

There are two main uses for this chamber, the first is the investigation of the errors produced by a vector magnetic field sensor close to zero flux and the second is to measure the remanent magnetisation of a specimen. Examples are in nT units.

Measuring Magnetic Errors

When measuring magnetometer errors it is necessary to separate the magnetometer and shield residual errors. Single or three-axis magnetic sensors should be placed as close as possible to the centre of the chamber and the zero field values (R_1) recorded. Next, the axis of the sensor under investigation should be rotated in the plane of investigation by 180° . In this way the error of the shield is caused to reverse but the error of the sensor is not. Record this second value (R_2) and calculate the magnetometer error (E_M) as follows:

$$E_M = (R_1 + R_2) / 2$$

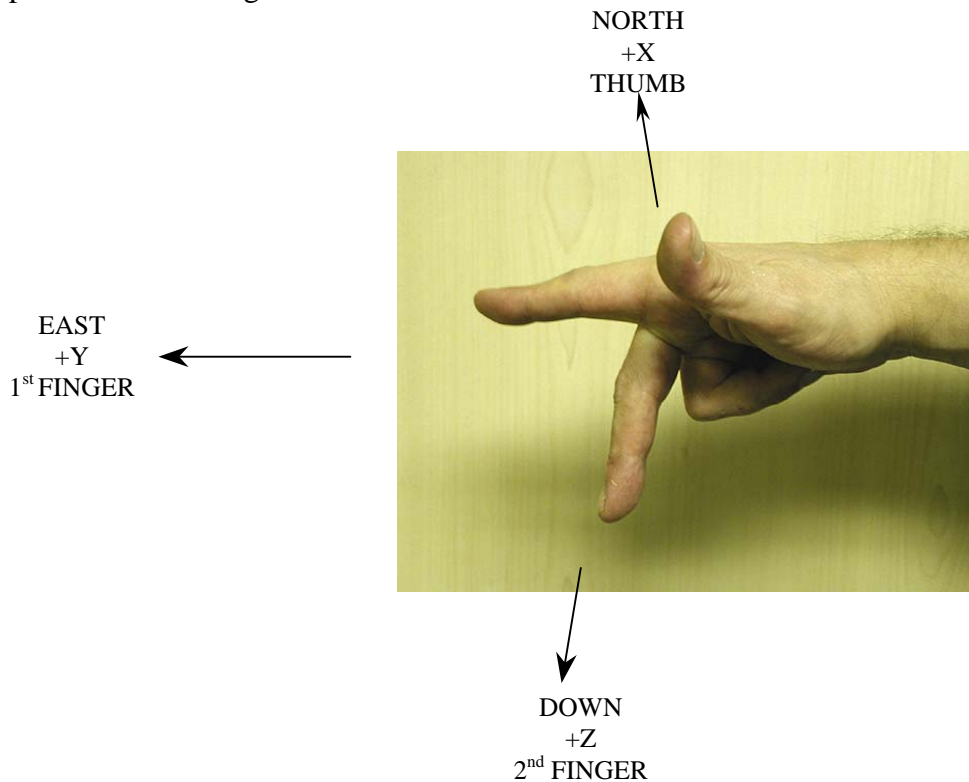
be sure to observe operation of signs, e.g. if $R_1 = -3$ and $R_2 = -10$

$$\text{then } E_M = ((-3) + (-10)) / 2$$

$$= -6.5$$

Conventions

It should be noted that Bartington Instruments adopts the internationally agreed 'right hand' convention for geomagnetic vector notation. The magnetic sensors produce a positive value when the direction arrow points towards magnetic north.



Measuring Remanent Magnetism

To measure the external magnetic field around a specimen a vector sensing magnetometer, *Mag-01* or *Mag-01H* with a *Mag Probe B*, is required. The magnetometer probe should be placed in, or near to, the centre of the chamber, with the directional arrow pointing east. Mark the specimen with X, Y and Z directions then place the specimen beside the sensor at a known distance.

Rotate the specimen 180° in the X, Y and Z planes recording the pairs of values R for parallel and anti-parallel to the sensing direction, i.e. R_{PX} , R_{AX} etc. and calculate the three directional components $V_{X,Y,Z}$ observing correct operation of the signs, where

$$V = (R_P - R_A) / 2$$

For example, if the residual error $E_{M/S}$ for the magnetometer and for the shield = -10nT, $R_P = -23$ and $R_A = +17$ then the component of the external field in the X direction has a value V_X of -20nT.

With these three values the total field can be calculated using the root of sum of squares and it's direction using direction cosines.

Degaussing

From the procedures described above it will be observed that it is not always essential to establish precisely zero field within the chamber. However, if this is a requirement the chamber may need to be degaussed. The residual errors are usually the result of exposure to high magnetic fields or to mechanical shock. This treatment can be carried out by the user with the degaussing wand provided.

Alflaglade Electronics Type PV1 (either 240V or 120V)

(This is provided free of charge and Bartington Instruments can not accept responsibility for reliability and safety of this product).

- 1 – Ensure that the correct mains supply voltage unit is selected.
- 2 – Using both hands press the red button with the wand removed from the chamber.
- 3 – Insert into the shield and withdraw slowly whilst maintaining a swirling action.
- 4 – Switch off when completely removed.
- 5 – Take no more than 30 seconds for the entire operation. Repeat after 5 minutes if required.

*Specifications of the products described in this brochure are subject to change without prior notice.
Specifications of Bartington Instruments' products are available on the Internet.*

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VIDEO ACCESSORIES

from Alfaglade Electrics Ltd

A MULTI-PURPOSE TUBULAR DEGAUSSING COIL

When a colour TV tube is subjected to stray magnetic fields, the resulting effect is a purity error, due to the permanent magnetisation of the shadow mask. This manifests itself as areas of unwanted stationary coloured patches, whilst viewing the screens display. There are internal degaussing coils fitted to the tube, which are automatically energised for a short period at switch on of the TV / Monitor. These however have little effect should an excessive field be encountered. It is also true that various metal parts of the TV / Monitor can become magnetised, having a similar effect upon purity.

The answer is to demagnetise the tube and associated metal chassis etc, using a degausser of correct design. Sufficient power is required to do so, whilst taking care not to damage the sensitive shadow mask situated behind the face plate of the tube.

The PVI degausser is intended for use with a 240v mains supply, although a 120v version is available upon request.

This compact and cost effective unit will have major interest to TV Service Departments, TV Manufacturers, TV Sales and Rental companies, TV Broadcasting Authorities, Universities & Colleges, The Armed Forces, Aviation & Computer Companies.

PVI -TECHNICAL DATA

Length (overall)	9.75"	248mm
Diameter	1.7"	43mm
Weight	1.51b	700gms
Supply voltage		200/240v @ S0/60Hz
Power consumption		200/240w nominal
Packaging (case)		ABS
Flash tested		12kv
Mains cable	6ft	1.85mtr

INSTRUCTIONS FOR USE

- 1/ Connect to mains supply
- 2/ Hold degausser in vertical position appx: 1" From face plate of the tube.
- 3/ Press switch & slowly sweep the entire surface area of the face plate, in a circular motion, whilst moving the degausser some six feet away before releasing the switch.
- 4/ The cabinet sides may be treated similarly.

**NOT rated for continuous use, overheating WILL occur if used for periods in excess of 30 seconds.
The plug is factory fitted with a 3A fuse, the rating of which MUST NOT BE EXCEEDED.**