

Bartington®
Instruments

Mag-01H

Fluxgate Declinometer/Inclinometer

For innovation in magnetic measuring instruments



Mag-01H

Fluxgate Declinometer/Inclinometer

This system comprises a single axis fluxgate vector magnetometer, type **Mag-01H**, a fluxgate probe, type Mag A and a Wild T1 steel-free theodolite. A steel-free tripod is available if required. The Wild T1 micrometer theodolite has a resolution of 6 seconds (can be estimated to 3 seconds). The Wild T1 theodolites are superior to the Zeiss theodolites in terms of ruggedness, reliability and ease of use.

Each pre-used Wild T1 theodolite is meticulously converted to be steel-free and restored as far as possible to its original condition. After conversion each theodolite is rigorously checked for magnetic hygiene and is guaranteed to be non-magnetic. The initial set-up procedure includes checking the magnetic cleanliness of the theodolite at each stage of assembly. The optical/magnetic collimation error is set to less than 20 seconds.

If requested, the **Mag-01H** declinometer/inclinometer can be checked against a reference system at a magnetic observatory for an additional charge.

Measurements of declination and inclination

The system provides fast, accurate and convenient measurements of the declination and inclination of the geomagnetic field. It is used in magnetic observatories, at repeat stations and for calibration of magnetic ranges and compasses.

For D (declination) and I (inclination) measurements, the equipment is used in the null mode where the probe is orientated perpendicular to the earth's field to achieve the highest angular sensitivity.

The excellent linearity allows the total field strength and the vertical and horizontal components to be measured. Angular changes in declination or inclination can be continuously monitored after setting the sensor to the appropriate null position.

Where the usual four observations are performed for D and I, the measurement resolution is limited by the prevailing geomagnetic conditions, the skill of the operator and the mechanical stability of the tripod, if used.



Mag-01H

Single Axis Fluxgate Magnetometer

The **Mag-01H** is a battery-powered instrument which provides the drive for the probe and processes its output to show the field strength on a 4½ digit display updated at 2 readings per second. An analog output is also provided.

The **Mag-01H** may be fitted with an audio output indicator, if requested. This facility enables the operator to seek the null position without continuously monitoring the digital display.

The unit incorporates a facility to offset the field experienced by the probe to $\pm 90\mu\text{T}$ in steps of $10\mu\text{T}$. This allows large fields to be backed-off so that small variations can be observed. A sensitivity switch can be used to select 1nT or 0.1nT resolution.

The non-magnetic internal battery provides 20 hours of continuous use and can be recharged via the mains adaptor or vehicle dashboard connector. Battery voltage is displayed for several seconds after switch-on and an audible alarm indicates when re-charge is required. The magnetometer and cable incorporate shielding against radio frequency interference.

Specification – **Mag-01H** instrument

Measuring range	0.1nT to 0.2mT
Bandwidth - x1 sensitivity	DC to 10Hz (-3dB) @ 20 μ T p-p. Roll off -12dB per octave
Calibration accuracy	0.1%
Maximum resolution	0.1nT
Zero field offset	\pm 1nT
Offset drift	0.01nT/ $^{\circ}$ C
Scaling temperature coefficient	<10ppm/ $^{\circ}$ C
Liquid crystal display	4 $\frac{1}{2}$ digit autoranging
x1 sensitivity	Displays 0 to 20 μ T with 1nT resolution and 20 to 200 μ T with 10nT resolution
x10 sensitivity	Displays 0 to 2 μ T with 0.1nT resolution and 2 to 20 μ T with 1nT resolution
Front panel	
on/off switch	Switches on internal battery
probe input	6 pole waterproof Fischer connector
charge indicator	illuminated when external supply connected
offset control	allows \pm 90 μ T in steps of \pm 10 μ T to be subtracted from the field at the probe
sensitivity control	increases the sensitivity by a factor of 10
Rear panel	
battery charger inlet	2.1mm socket 6-18V d.c. 0.5A max., polarity protected, continuous or intermittent use
analog output	4mm insulated sockets
x1 sensitivity	100 μ T/V, \pm 500 μ T max., 1nT resolution
x10 sensitivity	10 μ T/V, \pm 50 μ T max., 0.1nT resolution
output impedance	1k Ω
Enclosure	high impact ABS
Operating temperature	-10 $^{\circ}$ C to +50 $^{\circ}$ C
Relative humidity	80% non-condensing
Dimensions (mm)	155 x 170 x 68
Weight (g)	950

The instrument is supplied in a carrying bag.



Mag A
Probe with
theodolite

Mag A Probe

The probe alignment will normally be stable to 1 minute of arc over the suggested 2-year calibration period and re-adjustment is seldom required.

The linear fluxgate element within this probe features superb angular stability. The probe alignment will normally be stable to 1 minute of arc over the suggested 2-year calibration period and re-adjustment is seldom required.

The element converts the static terrestrial field into an alternating signal. The **Mag-01H** instrument converts this signal into a feedback current which is applied to a precision solenoid within the probe to maintain the element in null field. The magnetometer converts this current into a precise and stable measurement of the field.

A mechanically isolated enclosure protects the sensor from accidental misalignment. The probe has a strong but highly flexible 5-metre cable for connection to the **Mag-01H** instrument.

All Bartington Instruments fluxgate sensors are manufactured in-house and undergo rigorous processing and performance monitoring at all stages of production.

Each probe is individually calibrated to a standard which is traceable to the UK National Physical Laboratory.

Probes and electronics units are fully interchangeable with a cumulative calibration uncertainty of 0.25%.

Specification – *Mag* Probe A

Calibration accuracy	0.1%
Collimation error	<20 seconds (collimation adjustment by joystick and clamp)
Fluxgate element	temperature coefficient <10ppm/°C, length 55mm, with precision feedback solenoid
Protective enclosure	aluminium housing, mechanically isolated from element mounting
Operating temperature	-20 °C to +80°C
Dimensions (mm)	100 x 24 x 58
Weight (g)	250
Connecting cable	4-core overall screened high flexibility audio grade with 6 pole Fischer connector
length	5m standard (alternative lengths available)
core-screen capacitance	160pF/m
resistance	92Ω /km

Wild T1 steel-free theodolite

These optical theodolites are no longer manufactured so the units supplied are pre-used instruments which have been re-conditioned and converted to be non-magnetic. All magnetic components have been replaced by a non-magnetic equivalent. The horizontal and vertical axis bearings have been replaced with specially plated phosphor bronze parts and the steel ball-race removed from the horizontal axis. The WILD axis lubrication system ensures that these parts require zero maintenance.

The resetting mechanism for the horizontal circle is redundant in this application and has been eliminated to give enhanced accuracy. All theodolites undergo a rigorous check for magnetic hygiene and are guaranteed to be non-magnetic.

Theodolite (steel-free)	Scaling division	Estimation	Directional accuracy*
Wild T1 (360 °)	6 seconds	3 seconds	3 seconds

*The directional accuracy is given as the standard deviation to DIN 18723 of a direction measured in two telescope positions.

Weight with fluxgate sensor fitted	5.75kg
Weight in carrying case	9.4kg

A separate brochure for the WILD T1 theodolite is available on request.

Accessories

a.c. mains adaptor for 110/220/240V with outlet adaptors
Vehicle dashboard connector 12V d.c. output; (12-24V input)
Operation manual for <i>Mag</i> -01H declinometer/inclinometer and Wild T1 theodolite
Tubular level adjustment pins
Screwdriver
Orange filter and sun filter
Lens Cap, Lens cleaning kit & tissues
Pillar mounting adaptor (5/8[INCH] - 11 UNC) with pins on a 120mm PCD
Weight of <i>Mag</i> -01H and accessories in polycarbonate carrying case 5.1kg

Optional extras

Steel-free tripod (5/8[INCH] - 11 UNC)	Weight 6.1kg (8kg packaged)
Steep sighting prisms	
Audio output	
Calibration check at Hartland Point Observatory	
Chemiluminescent light sources (for night use)	

Specifications of the products described in this brochure are subject to change without prior notice.

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