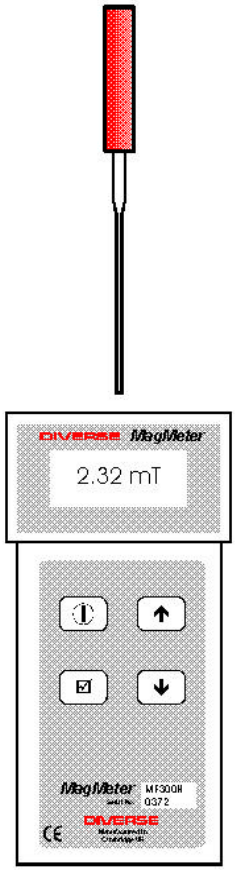
DIVERSE

MAGMETER MF300H

MAGNETIC FIELD STRENGTH METER

OPERATING INSTRUCTIONS

MARCH 2001



CONTENTS

DIVERSE TECHNOLOGIES
CAMBRIDGE
ENGLAND CB2 5EG

PREFACE

Thank you for purchasing MagMeter. Before using the unit, please read these instructions carefully. If you are uncertain about any aspect of its operation, please contact Diverse at Cambridge, England CB2 5EG, or email us for clarification at sales@diverse-technologies.net

The serial interface version of this product is provided with software to run on a PC. See our pages on the world wide web for free updates.

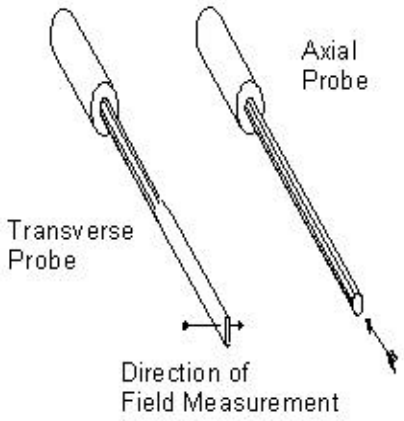


Fig. 1 MF300H Hall Probes

INTRODUCTION

The MF300H Magnetic Field Meter is used to measure the intensity and the direction of magnetic fields. The meter can be used to show the actual value of the intensity of the magnetic field or it can be used to measure the peak value over a period of time. The measured values can be presented in a range of units and the chosen options can be selected from a menu displayed on the meter.

The MF300H is supplied with a Hall probe which is sensitive to magnetic fields. Flat, tangential probes measure the field through the flat surface. Round, axial probes measure the field along the axis of the probe, (See fig. 1).

Magnetic fields can be measured in a range of units. The preferred unit can be selected from the menu displayed on the meter.

An RS232 output for connection of the Magmeter to a computer is available as an optional extra to the MF300H. Software is included with this option which enables the magnetic field measurements to be recorded by most spread sheets.

The MF300H Magnetic Field Meter is supplied in a carrying case together with a Hall probe. Versions which use the RS232 output are supplied with a lead for connection to a computer.

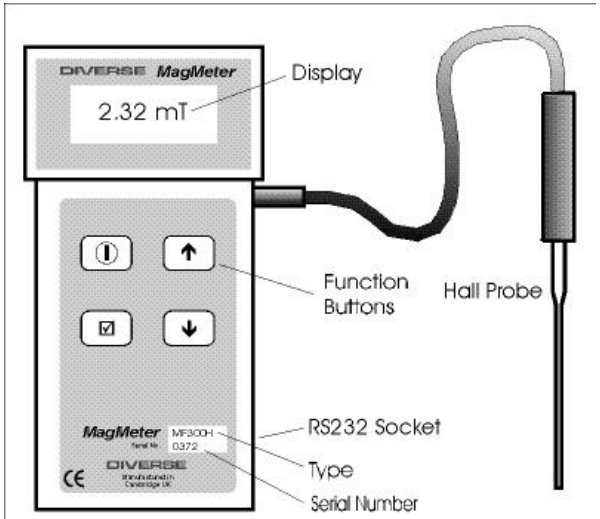


Fig. 2 MF300H MagMeter

FIRST TIME

The MF300H Magnetic Field Strength Meter is shown in Figure 2.

The Meters are calibrated a few days before delivery and a calibration certificate will also be supplied.

The unit requires 4 AA cells which should be installed in the battery compartment on the rear of the housing.

The Hall probe supplied with the meter is of a robust design suitable for the measurement of magnetic fields in workshops and laboratories. The probe will, however, be damaged, if it is subject to mechanical stresses or forces.

The sensitive region of the Hall probe is in the centre, two millimetres from the tip. Fig. 1 shows the location of the sensitive region and the direction in which the magnetic field is measured.

If you have chosen the serial interface version, you should install the software on your PC. To do this place the floppy disc in your drive. To install on DOS:

Type: A: <return>

INSTALL <return>

To install on Windows:
Use Program Manager: *run file*
Select drive A:
Double click on INSTALL.BAT.

The software will be copied to your hard disc C:\diverse.

OPERATION

The Magmeter has 4 keys:

○ power
☑ tick
↑ up
↓ down

The ○ and ☑ keys second meanings if held down for more than 2 seconds.

Step 1 Plug in the Field Probe

Step 2 Power On/Off

Switch the unit on by pressing the ○ key. The display shows the value of the magnetic field. To switch the unit off press and hold the ○ key for 2 seconds.

Step 3 Zero

The zero reading of the meter should be adjusted before taking readings. Hold the probe away from magnetic fields. The display should show 0.0. If not, press ☑ key for 2 seconds. The display

will change to zero. The probe can now be used to take measurements. The reading can be zeroed in this way at any time.

Step 4 Select Options

The MF300H can display the Average, Peak or RMS value of the magnetic field. To go from one to the another, press the down key each time. The nature of the current display is shown on the top right hand corner of the screen; thus "Average" = AVG, "Peak" = PEAK, "RMS" = RMS, "Select Units" = Blank.
The options are as follows:

Average = The unit averages 480 readings taken over a period of 300mSecs. The display of the averaged value is updated every 0.33 seconds.

Peak = The maximum value of the magnetic field recorded since the meter was last zeroed. Note that this is not the peak value of an alternating field; it is

the maximum value sensed for alternating, static or combined magnetic fields.

RMS = The Root Mean Square value of a sinusoidally varying magnetic field will be displayed.

If the current display is "Select Units", pressing the ↑ key will shift the flashing cursor to the next option on the right. Pressing the ☑ key will change the units to the one currently under the cursor and return the display to the "Average" mode. If no selection change is required, then pressing the ↓ key will change the display to the "Average" display without changing the choice of units.

Step 5 Select units

To Select the Units of measurement, press the ↓ key unitil the choice of units is displayed. These are mT (milli Tesla), T (Tesla), G (Gauss), KA/m (KAmps per metre), and Oe (Oersteds).

To select a new system of units, press the ↑ key until the required units are highlighted. Then press ☑ to confirm the units and display the value of the magnetic field in the most recently selected units. When the ↓ key is pressed then the display will show the value of the magnetic field without changing the units.

Note that the instrument cannot be switched off, nor will it auto-power off if the current display is "Select Units".

Step 6 Autoranging

The letters in the top left hand corner of the display indicate if the instrument is set to autoranging or manual range selection. The possible letters and their meanings are as follows.

AL = Autoranging with the display currently on the lowest setting.
AM = Autoranging with the display on the mid range.
AH = Autoranging with the display on the high range.

ML = Manually set to the low range.
MM = Manually set to the mid range.
MH = Manually set to the high range.

In the "Peak" and "RMS" modes of operation, the unit will only operate in the Autoranging mode.

When the unit is displaying the "Average" value of the magnetic field, then Autoranging can be switched on and off using the ↑ key. If Manual ranging is selected in this way, then the Low, Medium or High ranges can be selected by pressing the ○ button briefly.

Step 7 Serial Output

RS232 output. Readings from the MF300H can be output to a computer via the RS232 link.

Plug in the MagMeter using the cable provided.

Values can be output from any of the

Preface
Introduction
First Time
Operation
Software
Specification
Calibration
Liability

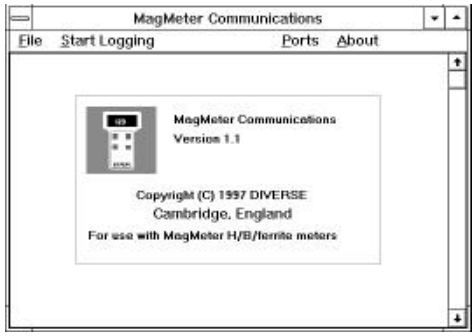
display options by pressing the ☑ key for less than two seconds. To interface with a PC, two programs are supplied, one for DOS operation and the other for Windows, see the software section.

Magnetic Particle Inspection..

A wide range of magnetising systems are used for Magnetic Particle Inspection. The value of the magnetic flux density required is specified in BS4069 as 0.72 Tesla. This is produced when a magnetising method with a magnetic field of 2.4kA/m is applied to a component made from material with a relative permeability of 240. Therefore, to check the MPI magnet, the MF300H meter should be set to read kA/m. The magnet should be switched on (if it is an electromagnet) and in the absence of the component to be measured, the field should be measured. If the value is greater than 2.4kA/m then the magnet meets BS4069. When the magnet is used to magnetise a steel component it will have a flux density of over 0.72Tesla.

SOFTWARE

The serial version of the MF300H is supplied with software to run on a PC compatible running either DOS or Windows, see First Time for information about installation. Both versions have a similar user interface, use the same configuration file and produce the same format of output file.



Windows Version

The program name is: MAGW.EXE. Its operation under windows 3.1/95 is as follows:

Run the program by either installing its icon into a group in program manager/start run, or running it directly with file manager/explorer.

Preface
Introduction
First Time
Operation
Software
Specification
Calibration
Liability

First time you should identify the communications port you wish to use. This is stored in the configuration file, and will be automatically selected next time it's run.

Select *Start Logging*. This will display the file type identification together with a date and time stamp. Readings can then be taken by pressing the tick key. As the readings are taken, they are
displayed on the screen, together with the mode, range and units selected, if any of these are changed.

Once you have completed the data collection, select *Stop Logging*, and you will be prompted for a filename in which to save the data.

Free updates to the logging software are placed on our web site:

http://www.diverse-technologies.net

DOS Version

First time the program prompts you for the communications port you wish to use. Once selected this is stored in the configuration file, and will be automatically selected subsequently.

Select *R*. This will display the file type identification together with a date and time stamp. Readings can then be taken by pressing the tick key. As the readings are taken, they are displayed on the screen, together with the mode, range and units selected, if any of these are changed.

Once you have completed the data collection, press *escape*, and you will

Preface
Introduction
First Time
Operation
Software
Specification
Calibration
Liability

be prompted for a filename in which to save the data. Press return if you do not want to save it.

SPECIFICATION MF300H

Accuracy:
Transverse probe +/- 1% of full scale
Axial Probe +/- 2% of full scale

Operating Temperature: 0C to +40C
The instrument has temperature compensation for the Hall probe.

Units: mT, T, G, A-T/m, Oe

Range: 0 - 1.99T, autoranging.
Manual ranging is also available in three decade switches.

Resolution: 10uT, 100uT, 1mT.

Zero: The instrument can be zeroed in any field up to 50G.

Modes: Average: Normal reading over 10ms. Peak: Peak value , 10ms samples RMS of peak

Probe: Active area 0.2x0.2mm
Power: 4x AA (R150) Alkaline Cells

Preface
Introduction
First Time
Operation
Software
Specification
Calibration
Liability

UNITS

	Symbol	cgs	SI
Magnetic Flux	ϕ,	Maxwell,	Weber
Flux Density	B,	Gauss,	Tesla
Magnetising force	H,	Oersted,	A-T/m
Vaccuum permeability	μ_o,	1,	4π.1E-7

A-T/m is Ampere-Turns/m

Conversion Factors

	Multiply by	To Obtain
Gauss	1E-4	Tesla
Oersted	79.577	A-T/m

In a vacuum then $B=\mu_o H$
When $\mu_r=1$:
Flux density B in Gauss =
Magnetising Field H in Oersteds.
Flux density B in Tesla =
4π.1E-7 x H in A-T/m

CALIBRATION & REPAIR

The MF300H and probe is supplied with a calibration certificate. It is recommend that the unit is returned to the supplier annually for recalibration. If the MF300H requires repair, the unit should be returned to the supplier, there are no user serviceable parts. If you have difficulty in getting the unit repaired or calibrated, please contact:
Diverse Technologies & Systems Ltd.
Kingfisher House, High Green
Great Shelford, Cambridge CB2 5EG
England, Tel: +44 (0) 1223 84 44 44

Low Battery

If the MF300H displays the legend "LB" the batteries are low. If you have purchased the rechargable unit then connect the charger and wait at least 30 minutes before using. Wait 8 hours for full recharge. If you have the dry cell unit replace with 4xAA alkaline cells.
Never use the battery charger with conventional dry cell batteries.

LIABILITY

Diverse Technologies accepts no responsibility for the consequential losses arising from the ability or inability to use the equipment supplied. The limit of warranty is the repair or replacement of any faulty components, directly attributable to manufacturing defects, arising during the period of 12 months following purchase. This does not include damage resulting from incorrect operation of the unit.

Designed and manufactured by:-

Diverse Technologies & Systems Ltd.
Kingfisher House
High Green
Great Shelford
Cambridge CB2 5EG
England
Tel: +44 (0) 1223 84 44 44
Fax: +44 (0) 1223 844 944
Email: sales@diverse-technologies.net
http://www.diverse-technologies.net