

## GM07 & GM08 Gaussmeter

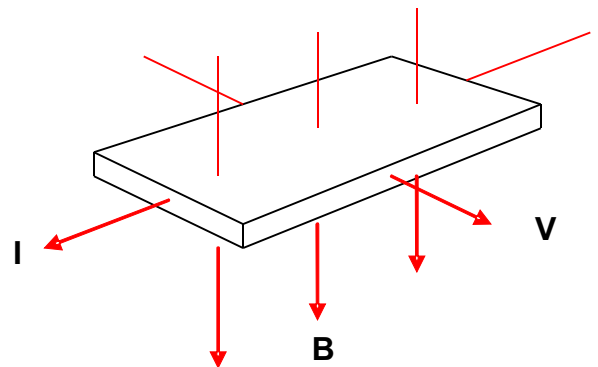


- Menu driven
- Graphical LCD display
- DC, AC, PEAK, MAX, HOLD and STORE functions
- Operating function and units displayed
- USB & RS232 (GM08)
- Battery operated
- External power supply connection (GM08 only)
- Multi lingual
- Thin semi-flexible probe
- Visible measurement point
- Probe polarity indicator

Hirst Magnetic Instruments' GM07 and GM08 microprocessor controlled gaussmeters complement the range of Hirsts compact desktop instruments. Designed for factory floor, on site and laboratory use the instrument offers a simple menu driven front end.

Hirst Magnetic Instruments' GM07 and GM08 microprocessor controlled Gaussmeters offer sophisticated measuring functions in a simple to use, menu driven, hand-held package.

Designed for factory floor, on site and laboratory measurement of magnetic flux Density and Magnetic Field Strength in SI or CGS, these instruments give excellent value for money



## Introduction

The GM07 and GM08 Gaussmeters have been designed and manufactured by Hirst Magnetic Instruments Ltd, a company with more than 40 years experience in Magnetic Measurement. This experience and our extensive knowledge of the magnetics market has enabled us to design an instrument incorporating all of the measurement functions a user is likely to need. The GM07/08 is controlled via a simple menu and is supplied with a thin semi-flexible Transverse Hall Probe suitable for all but the very smallest of applications.

The GM07/08 incorporates an analogue peak detector for the DC and AC peak functions. This, coupled with the microprocessor operation means fast response is possible with digital stability (fast pulses / no droop in readings).

## Measurement functions

The GM07/08 can measure :-

- DC** DC magnetic field measurement.
- DC PEAK** Maximum positive peak reading of the DC field.
- AC RMS** True RMS (Root mean Square) of input signal.
- AC RMS MAX** Maximum true RMS.
- AC PEAK** Maximum positive peak value.

## Utilities

The GM07/08 has a number of UTILITIES options allowing the operator to disable or select various times for the automatic POWER DOWN. Also nulling routines can be selected.

The GM07/08 also has the facility to operate its menu structure in English, French German, Italian, Spanish and Portuguese.

## Calibration

The GM07/08 is calibrated to standards traceable to the National Physical Laboratories.

During manufacture, the accuracy of nuclear magnetic resonance (NMR) is used to determine the irregularities and non-conformities of the GM07/08 and its Hall Probe. This is stored and used mathematically to automatically correct readings taken by the GM07/08.

## Measurement units

The GM07/08 can measure magnetic flux density or magnetic field strength. The menu system enables the operator to easily choose between Tesla, Amps/m (SI Units), Gauss or Oersted (cgs units).

## Data capture

The GM07/08 can HOLD measured values by pressing the Hall Probe button. Pressing the button again releases HOLD (when enabled).

The GM07/08 can also STORE measured values. These values can later be RECALLED, either on the meter or via RS232/USB with the GM08.

## Applications

The GM07 is ideal for inspection and measurement of magnetic flux density of magnets and magnetic assemblies in both goods inward and Quality Assurance environments.

Where individual measurements need to be recorded the GM08 will store and upload not only the measured values, polarity, measurement units and measurement function, but also the time at which the measurement was taken.

Applications include: Computer Disk Drive Actuators, Loudspeaker Air Gaps, Electric Motor air gaps (including pancake and Permanent Magnets), Transformer Stray Field measurements, Magnetiser and Demagnetiser Field measurements, Bending Magnets, Non-Destructive Testing (Magnetic), Goods inward and Quality Assurance Inspection, automated magnet calibration, etc.

## GM08 Communications

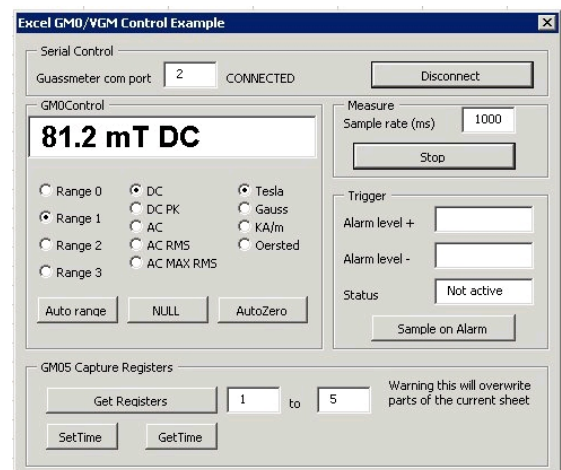
The GM08 features all of the functions of the GM07 plus:

An interface to provide RS232 and USB communication for uploading measurement data to a host computer. The GM08 can also be remotely controllable via this link.

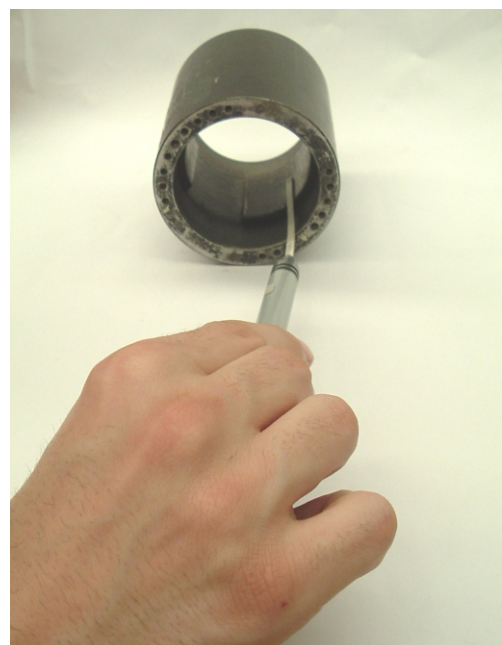
A full driver suit is available as an optional extra. This includes sample programs with full source code (Microsoft Visual C++ .NET) for the 2000 operating system, XP and later. A Labview<sup>1</sup> VI is included. Linux is also supported.

The GM08 also incorporates a non volatile memory to enable the retention of stored values even when switched off.

The GM08 also includes a time keeping device to record the time data is stored and an external DC power supply socket for bench top applications.



Screen shot from within Microsoft Excel



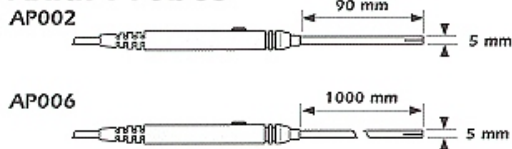
## GM07 & GM08 Hall probes

Both the GM07 and the Gm08 are supplied with a transverse Hall probe as standard (Tp002).

The design of the Hall probe is critical to the satisfactory operation of any gaussmeter. For the GM06 and GM07 we have used our experience to produce a transverse Hall probe which is semi-flexible and only 1 mm thick by 4 mm wide. This enables operators to take measurements in tight spaces and narrow air gaps. In addition the sensitive Hall element is clearly visible so the user knows exactly where the measurement is being made..

The probe is fitted with a push button enabling the operator to HOLD and STORE measurements and orientate the probe for polarity readings.

### Axial Probes



All transverse and axial probes are fully interchangeable with Hirst Magnetic Instruments Ltd's GM04, Gm05, VGM01, BGM01, GM07 and GM08 gaussmeters

Axial and transverse probes are also available with longer cable lengths. If you require a long cable or a custom probe please contact the sales office for more information

### Hall Effect Theory

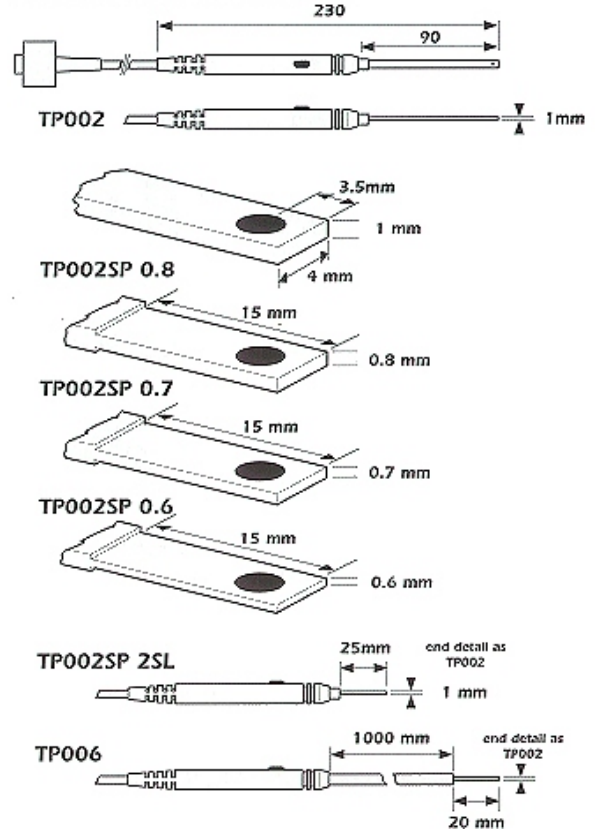
In an ideal world, a Hall Element consists of a small slab of semi-conductor material. Current passes from one end of the slab to the other and the voltage on each edge of the slab is the same when no magnetic field is present. If a magnetic field is now applied through the top to bottom surfaces of the slab, a voltage appears across the sides of the slab which is directly proportional to the Magnetic Flux Density or Magnetic Field Strength. In reality, all practical Hall Probe elements are only linear within certain limits, normally 1%-2%. The more accurate and thinner the probes, the greater the expense. Most Gaussmeter manufacturers approach this problem by selecting current and Hall Probe load resistance to minimise these non-linearity errors.

The Hall Probes are connected to Gaussmeters, the Gaussmeters are designed to be linear to make the best use of the non-linear Hall Probes.

The philosophy behind the design of the GM04 is that both the Probe and the Gaussmeter will contain non-linearities and errors. The difference between a theoretical, perfect Hall Probe and that of an individual Hall Probe is measured and the difference recorded in an E2prom located in the Hall probe socket (this memory device also contains other information such as serial number and calibration date).

The perfect Hall Probe is in fact a calibration process using a technique known as Nuclear Magnetic Resonance (NMR) which gives very high accuracy.

### Transverse Probes



The errors between the GM07/08 and an ideal electronic circuit are measured and recorded in it's internal E2prom.

When a measurement is taken the voltage generated by the Hall Probe element is amplified by the GM07/08 electronic circuit and digitised in an Analogue to Digital converter.

The software of the GM07/08 then automatically corrects this data mathematically, firstly with the Hall Probe calibration information and then with the GM07/08 calibration information.

This technique gives superb results and enables calibration of the Gaussmeter to be carried out in software rather than "select on test" resistor values. The GM07/08 includes other innovative techniques which further improve and give additional long term stability.

The GM07/08 also includes a linear analogue circuit for peak detection. This dedicated circuit enables the accurate capture of transient events without the inherent delays of Analogue to Digital Converter sampling times.

Although this captured voltage level will decay, In the analogue circuit, it is converted and displayed from a digital storage giving zero droop digital storage.

**GM07/08 SPECIFICATION****AUTO RANGING AND MANUAL RANGING****Range 1**

0 to more than 3 Tesla  
resolution 1 milliTesla

**Range 2**

0 - 299.9 milliTesla  
resolution 100 microTesla

**Range 3**

0 - 29.99 milliTesla  
resolution of 10 microTesla

**Range 4**

0 - 2.999 milliTesla  
resolution of 2 microTesla

Measurements can be made in Tesla,  
Gauss, Amps/m or Oersted.

(1 mT = 10 Gauss = 0.796 kA/m)

**Accuracy (at 20 degC)** +/- 1%

**(DC) Traceable NPL**

**Reproducibility** +/- 0.5%

**Temperature Coefficient**

Better than +/- 0.1 % of reading / degC  
including probe.

**Frequency Range**

DC and 15Hz to 10kHz

**Averaging Time Constant**

100 milliseconds

**Functions**

DC, DC Peak, AC RMS, AC RMS MAX, AC  
PEAK

**Display**

LCD graphics display monochrome.

**Display Sampling rate**

3 / second (approx)

**Facilities**

Store and Recall on 0 99 samples. Hold  
facility. Analogue peak with digital storage.  
Auto and manual ranges. Automatic  
reading conversion between different units.  
Operating setup at time of power down is  
stored and recalled automatically at power-  
on. Functions are selected with an easy to  
use menu.

**Operating Temperature Range**

0 degC to +50 degC

**Storage Temperature Range**

-20 degC to +70 degC

**Battery Type**

4 of Longlife 1.5V Alkaline AA cells.

**Battery Life**

Battery Life of 15 hours continuous operation.  
Auto power down after 1, 4 or 10 minutes or  
can be disabled, all under menu control.

**Dimensions**

Length	175mm
Width	89mm
Height	40mm

**Weight**

430 g (not including probe)

**Standard Accessories**

Transverse Hall Probe, Zero Flux Chamber and  
Carry Case.

**Optional Accessories**

Axial Probe Ref AP002.  
Replacement Transverse Probe Ref TP002.  
Reference Magnets Axial and Transverse  
contact factory for details.

**GM08 ADDITIONAL FEATURES****RS232 and USB**

Used for data transfer and remote control.  
Software handshaking. USB 1.1 Compliant.

**Analogue Output**

+/- 3 Volts full scale.

**Non volatile memory**

The GM07 and GM08 will retain stored  
measurements when the instrument is switched  
off.

**Time Keeping**

The GM08 has a time keeping device so that  
the time that measurements were taken can  
also be recorded.

**External PSU Socket**

An external PSU (not supplied) may be used to  
power the GM08 when used in bench top  
applications.

**ADDITIONAL STANDARD ACCESSORIES****Software**

Windows communication software is supplied  
with the GM08. This allows the user to  
download readings, stored data and control  
the instrument remotely.

**The Hall Probe**

Both the GM07 and GM08 are supplied with a  
transverse Hall probe as standard.

The design of the hall probe is critical to the  
satisfactory operation of any gaussmeter. For  
the GM07 and GM08 we have used our  
extensive industrial experience to produce a  
transverse Hall probe which is semi-flexible and

only 1mm thick by 4mm wide. This enables  
operators to take measurements in tight spaces  
and narrow air gaps. In addition the sensitive Hall  
element is clearly visible so that the user knows  
exactly where the measurement is being made.

The probe is fitted with a push button enabling the  
operator to HOLD and STORE measurements and  
orientate the probe for polarity readings.

An axial probe is also available as an optional extra.  
This is only 5mm in diameter and also incorporates a  
push button for HOLD and STORE functions.

All transverse and axial probes are fully  
interchangeable on both the GM07 and GM08  
without the need for re-calibration.

**Compatibility**

The probes of GM04 and GM05 meters are directly  
compatible with the GM07 and GM08 and fully  
interchangeable.

The software interface (RS232) is also compatible. A  
GM08 can directly replace a GM05 in service.

**RoHS Compliance**

Both the GM07 ,GM08 meters, probes and  
accessories are RoHS compliant.

Hirst Magnetic Instruments Ltd. also manufactures wide  
ranges of magnetic instruments, magnetisers,  
demagnetisers, precision demagnetisers and special  
magnetic systems.

Due to a process of continual improvement, Hirst  
Magnetic Instruments Ltd. reserve the right to change  
any specifications without notice.

Document: