

GM07/GM08 GAUSSMETER OPERATING MANUAL

EN

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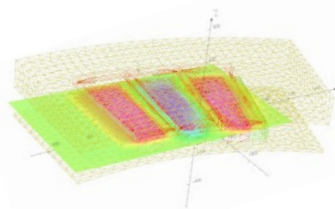
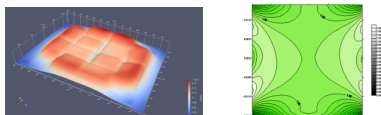
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CONTENTS

HOW TO GET GOING.....	2	UNITS	9
INTRODUCTION.....	3	TESLA	10
THEORY OF OPERATION.....	3	GAUSS.....	10
HOW TO USE THE GM08.....	4	AMPS/METER	10
THE HALL PROBE	4	OERSTED	10
THE GM08 INSTRUMENT	4	CAPTURE.....	10
GM08 LAYOUT.....	4	SAVE ON.	10
GM08 DISPLAY FORMAT	5	SAVE OFF	10
KEY OPERATION.....	6	RECALL ON	11
ON	6	RECALL OFF.....	11
OFF	6	HOLD ON	11
ENTER	6	HOLD OFF.....	11
NEXT.....	6	UTILITIES.....	11
MENU	6	NULL.....	11
RANGE	6	AUTO ZERO	11
RESET	7	POWER DOWN	12
HALL PROBE BUTTON	7	LANGUAGES.....	12
RS232, USB SERIAL INTERFACE.....	7	HALL PROBE.....	12
DC POWER SUPPLY SOCKET	8	AC MEASUREMENT ACCURACY.	12
MENU OPTIONS.....	8	POLARITY.....	13
GENERAL	8	BATTERY REPLACEMENT	13
FUNCTION	8	USING A GAUSSMETER.....	13
DC	8	ANALOG OUTPUT.....	14
DC PEAK.....	8	SPECIFICATION.....	15
AC RMS.....	9	COMPANY ADDRESS	16
AC RMS MAX	9		
AC PEAK	9		



HOW TO GET GOING

The GM08 is designed to be easy to use and assumes you never get as far as reading this let alone the rest of the manual.

So this is how to get going:

1. Insert the batteries
2. Plug in the probe
3. Press the ON key
4. Wait while the GM08 carries out self calibration (10 seconds approximately).
5. When the GM08 completes it's self calibration it will enter into the mode of operation last used.
6. If you want to change something, press the MENU key to display the first menu Option. To look at different Menu options, press the NEXT key to cycle through the Options until you find what you are looking for. Then press ENTER.
7. Press MENU key again to clear the Menu line of the display.
8. Press MENU key again to display the main Menu Option back at the first Option.
9. Change Measurement ranges with the Range key.

If you want to do more adventurous things you could always try reading the rest of the manual!

HINT

When changing and selecting Menu Options, hold the GM08 with both hands with your thumbs over the ENTER and NEXT keys. This will enable you to easily and rapidly change settings.

PLEASE NOTE

The Transverse and Axial Hall probes supplied for use with the GM08 Hand Held Gaussmeter are very robust compared to the previous generation of Hall Probes.

It should be noted, however, that without due care these probes can be irreparably damaged due to bad handling and incorrect use.

Operators are advised to take due care.

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INTRODUCTION

Congratulations on choosing the GM08 the latest in a family of Gaussmeters by Hirst Magnetic Instruments Ltd, with more than 30 years experience in manufacturing Magnetic Instruments and Magnetic Equipment.

The GM08 incorporates many innovative functions and new features.

All GM08 Probes are compatible with the GM08 without the need for re-calibration by the operator.

Each GM08 Probe contains information unique to that Probe which enables the GM08 to carry out automatic calibration at switch on and Auto Zero (see Utilities).

The GM08 incorporates a 120 by 32 pixel graphic menu driven display. This enables operation of the GM08 to be carried out simply with a minimal number of keys and with minimal training.

The GM08 incorporates an RS232, USB interface, analog interface and external Power Supply Unit (PSU) socket.

The GM08 Hall Probe includes a button for Probe orientation (Transverse Probes) and HOLD for Saving readings.

The Transverse and Axial Hall probes supplied for use with the GM08 Hand Held Gaussmeter are very robust compared to the previous generation of Hall Probes.

It should be noted, however, that without due care these probes can be irreparably damaged due to bad handling and incorrect use.

Operators are advised to take due care.

THEORY OF OPERATION

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 GM08 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.

The errors between the GM08 and an ideal electronic circuit are measured and recorded in its internal E²prom.

When a measurement is taken the voltage generated by the Hall Probe element is amplified by the GM08 electronic circuit and digitised in an Analogue to Digital convertor.

The software of the GM08 then automatically corrects this data mathematically, firstly with the Hall Probe calibration information and then with the GM08 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 GM08 includes other innovative techniques which further improve and give additional long term stability. The GM08 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 Convertor 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.

HOW TO USE THE GM08

The GM08 Hand Held Gaussmeter and Probe is used to measure Magnetic Flux Density or Magnetic Field Strength.

There are two parts to the GM08:

1. The Probe that actually senses the Magnetic Field and produces an electrical signal.
2. The GM08 Instrument itself, that then processes these electrical signals to display actual measurements that the user can read off the display.

THE HALL PROBE

The sensitive part of the Hall Probe (the Hall Element), is placed into a Magnetic Field. The Hall Element must be at right angles to the Magnetic lines of Flux to give a maximum reading.

In practise, this is a case of placing a Transverse Probe into an air gap between two magnetic poles and adjusting it to give a maximum reading, or placing an Axial Probe into the centre of a solenoid and adjusting its position to give a maximum reading.

THE GM08 INSTRUMENT

The Hall Probe is plugged into the Hall Probe connector at the top of the GM08. The measured magnetic field and other necessary information, is shown on the Liquid Crystal Display.

The various keys on the GM08 enable you to turn on and off the GM08, change ranges and control the Menu.

The majority of functions and facilities within the GM08 is controlled through an easy to use menu.

By pressing the MENU key, the first Menu Option is displayed. By pressing the NEXT key, the next Menu Option is displayed. Pressing the ENTER key will allow you to enter that Option.

In this way, the Operator can quickly change measurement units or function etc in the Gaussmeter with the most

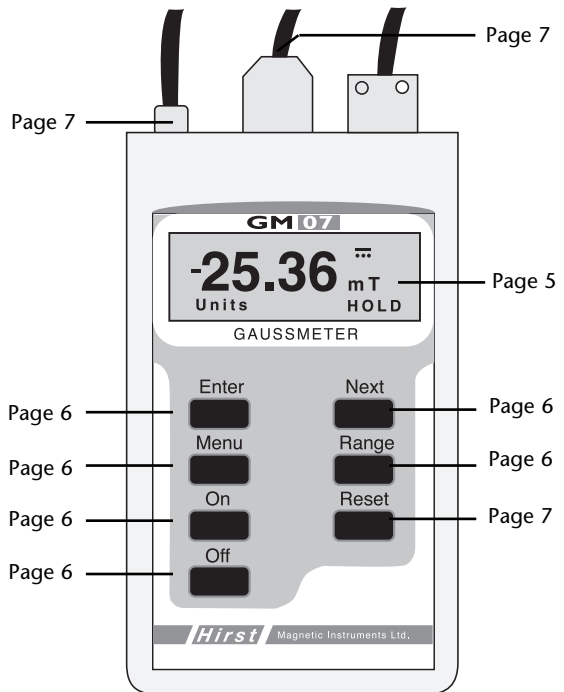
frequently used Options being the quickest to access.

GM08 LAYOUT

The GM08 Hand-Held Gaussmeter consists of a main hand-held unit and Hall Effect Probe.

The main Hand-Held unit consists of a 120 by 32 pixel graphic LCD, 7 keys and Hall Probe socket.

This manual gives information on the operation of the various parts of the GM08. This GM08 layout diagram will give you quick access to the appropriate page of this Manual.



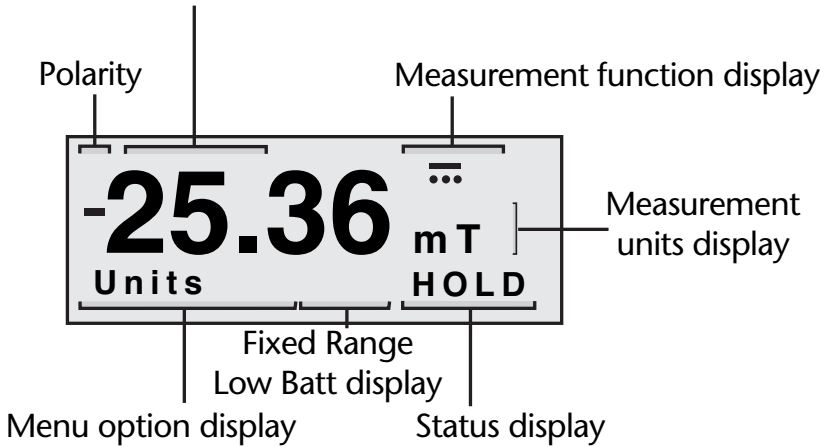
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GM08 DISPLAY FORMAT

Measurement value display



The GM08 display is a 120 by 32 pixel graphic liquid crystal display LCD.

Areas of the display are dedicated to specific functions so that, for instance, the measurement is always displayed in the top left of the display.

The display format has been designed so that when the GM08 is being used to take measurements, the display does not contain irrelevant and confusing information.

MEASUREMENT VALUE DISPLAY

The measurement value display shows the measurement digits. This includes four digits, plus decimal point and sign. Measurements taken or recalled in any measurement function are always displayed in this position.

MEASUREMENT UNITS DISPLAY

The measurement units display shows the units in which the measurement is currently being taken. Measurements taken or recalled in any measurement function always have their units shown in this position.

MEASUREMENT FUNCTION DISPLAY

The measurement function display shows symbols for the current measurement function. Measurements taken or recalled in any measurement function always have their measurement function displayed in this position.

When displaying a FUNCTION Menu Option a non symbolic form is displayed. When this is selected the symbolic form is displayed in the measurement function display position.

MENU OPTION DISPLAY

When the menu is in operation, it is always displayed in the Menu Option display position. The Menu Option displayed can be selected by pressing the ENTER key. Alternative Options may be displayed by pressing the NEXT key.

The Menu Option display can be activated by pressing the MENU key.

STATUS DISPLAY

In certain functions, normal operation of the GM08 is altered, ie HOLD. The Operator is advised of this condition by the status display. If normal status of the GM08 is active then the status display is blank.

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KEY OPERATION

GENERAL

The GM08 is switched on and off with the ON and OFF keys.

With USB or a DC power supply connected the GM08 powers on when power is applied. The Range is changed or set to Auto Range by pressing the Range button.

Most of the functions of the GM08 are controlled through an easy to use Menu. Cycle through the Menu to choose your Option. The Menu is displayed, always with its first Option when you press the MENU key. If the MENU is already displayed, pressing the MENU key removes it. Press MENU again and the first Menu Option reappears.

Cycle through the four Menu Options by pressing the NEXT key. When you see the Option you want - press the ENTER key then cycle through the new Options with NEXT again. The frequently used Options are quickest to get to.

ON

The ON key is used to switch on the GM08. The GM08 turns on with an audible bleep and the display will show GM08.

The GM08 will carry out a self test and calibration before entering the operating set up when the GM08 was last used.

To change the operating set up, press MENU and move through the Menu options using NEXT. Select with ENTER.

OFF

The OFF key is used to switch off the GM08. The GM08 will give an audible bleep before switching off.

When the GM08 is switched off it stores the current operating settings. When the GM08 is again-switched on it will return to this operating set up.

NOTE: When the GM08 is switched off all stored readings (but not operating settings) will be lost.

To remove the Hall probe from the meter, first power down the meter and remove the probe. Do not remove the probe with power applied as this may possibly cause data corruption of the internal memory and the current operating settings may be lost.

The GM08 is fitted with an Auto power-down facility. If a button has not been pressed for 1, 4 or 10 minutes the GM08 will power-down automatically. The time for power-down is user selectable in the menu and the auto power-down function can also be disabled (Utilities Menu Option).

ENTER

When using the Menu, pressing the ENTER key will select the Menu Option that is currently displayed.

When a different Menu option is required, the next Option can be displayed by pressing the NEXT key.

NEXT

When using the Menu, pressing the NEXT key will show the next option in the Menu or sub-menu to be displayed.

When the required Menu or Sub Menu option is displayed it can be selected by pressing ENTER.

MENU

Most of the functions of the GM08 are controlled through a Menu. When the Menu or Sub Menu options are not being displayed, pressing the MENU key will cause the first option in the main Menu to be displayed.

Pressing the MENU key when a Menu or Sub Menu option is being displayed will clear the Menu line. Pressing the MENU key again will now reinstate the first option in the main Menu.

RANGE

Pressing the RANGE key will cause the working range of the GM08 to change. When in AUTO range, the GM08 will automatically change ranges as the Magnetic Flux Density or Magnetic Field Strength increases and decreases.



In some functions, ie DC peak, when measuring pulsed fields, it is necessary to use manual ranges. Pressing the RANGE key will cause the GM08 to leave the Auto range mode and enter a set Range.

Further presses of RANGE key will cause the GM08 to enter successively less sensitive ranges until returning to Auto range.

When in a manual range "O" symbol will be displayed.



RESET

When using the DC Peak or AC RMS MAX modes, it is necessary to reset the display between readings.

Pressing RESET resets the displayed reading to permit the next peak value to be measured.

The Reset key is also used in Null and Auto Zero Options in the Utilities Sub-Menu.

HALL PROBE BUTTON

This key is positioned on the Hall Probe handle and is used for two functions:

1. The HOLD function - Readings can be held with a press of the Hall Probe button and released with a second press.
2. The STORE function - Readings can be stored by pressing the Hall Probe button (only when the store function is active). The Hall Probe button can be made inactive. (Capture Menu Option).

The Transverse and Axial Hall probes supplied for use with the GM08 Hand Held Gaussmeter are very robust compared to the previous generation of Hall Probes.

It should be noted, however, that without due care these probes can be irreparably damaged due to bad handling and incorrect use. Operators are advised to take due care.

RS232 SERIAL INTERFACE , USB INTERFACE (GM08)

GENERAL

The GM08 can be controlled by, and can upload data through the RS232 and USB interfaces.

The GM08 is supplied with a serial connector to enable a standard NULL MODEM 9 way D type cable to be connected, from a PC, to the GM08. Along with a USB port for USB connection. Using a USB A to MINI B type lead. Batteries must still be fitted whilst using the USB interface.

The GM08 is also supplied with a cd rom disk with basic PC compatible software and documentation.

SOFTWARE

Instructions for using the Software are on the cd rom, read the readme.txt file for installation instructions.

Software Installation

If in Windows insert GM08 Communications disk in cd rom drive and then follow the simple instructions to install.

CONNECTING THE GM08 TO A COMPUTER

Interface and Cable Connections

The GM08 has a 9 way 'D' shaped connector (port) at the top of the unit. You will need a NULL modem cable with a 9 way female end for the GM08 port.

You will need to purchase or have available a cable with a 9 way connector at one end (RS232 Cable.) This cable plugs into the top of the GM08 and then off to the PC.

The choice of either 9 way or 25 way connection at the PC end is dependent on your PC.

Alternatively use a USB A to MINI B cable for USB communications. If both serial and USB cables are fitted, serial communications are disabled.

Application notes

The programs included on the cd are for basic control and transfer of data. Optional software

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and advanced information on the serial protocol is available to allow the user to write custom software on windows and unix platforms.

It is important that you connect the Serial Cable / USB cable between the GM08 and your PC, BEFORE running these programs. Failure to do so will not damage the GM08.

Windows 95-98, 2000 XP Users

Follow the instructions in the readme.txt file on the enclosed cd rom.

SERIAL INTERFACE UNIT

As previously supplied on GM05.

There is no separate conditioner (level shifter) for the RS232 port on the GM08. The GM08 can be directly connected to the RS232 port of the computer via a NULL modem cable.

PIN ASSIGNMENTS - 9 WAY CONNECTOR - GM08 side

Pin	Description
2	Received data (input to GM08)
3	Transmit data (output from GM08)
7	Active RS232 level (output from GM08)
5	Signal Ground
6	CTS (Assumed Active)

ALL OTHER PINS ARE NOT CONNECTED

The active level on Pin 7 can be used to tie any hardware handshaking lines active, this is required on some machines. The GM08 serial protocol does not support handshaking, therefore any hardware handshaking on the host machine MUST BE DISABLED.

COMMUNICATION SETTINGS FOR GM08 RS232 INTERFACE

9600 Baud, 8 data bits, 1 stop bit, no parity.NO damage will occur if the GM08 is turned off whilst the host machine is on.

DC POWER SUPPLY SOCKET (GM08)

The GM08 is fitted with a 2.1mm external power supply socket. This enables a DC Power Supply Unit (PSU) (not supplied) to be used with the GM08.

Batteries must still be fitted in the unit. However, only a small amount of current will be drawn from the batteries for memory retention.

The socket is a standard 2.1mm DC power supply socket with the positive to centre, negative to shell. The GM08 will require a voltage supply between +5V and + 6V DC.

This input is protected from supply reversals to avoid damage to the GM08 if the input voltage is reversed.

MENU OPTIONS

GENERAL

Most of the functions of the GM08 are controlled through the Menu. (Range and Reset Control have their own keys).

Each main Menu Option has its own Sub-Menu.

MENU OPTION

FUNCTION

DC, DC Peak, AC RMS, AC RMS MAX and AC Peak.

When the FUNCTION option is displayed and the ENTER key is pressed, the GM08 will enter the FUNCTION SUB MENU and display the first sub-option.

Pressing NEXT will enable the user to move through the options available. The DC function measures Magnetic flux density or Magnetic field strength of a static or DC Magnetic field.

Pressing ENTER will select the displayed Sub-Menu Option.

FUNCTION SUB-MENU OPTIONS

DC

This function measures Magnetic flux density or Magnetic field strength of a static or DC Magnetic field.This reading is updated as the static Magnetic field varies.

DC PEAK

This function measures the peak positive DC Magnetic Flux density or Magnetic Field Strength.

This reading is updated with increasing measurements. Once a maximum measurement has been reached this value will be held until the RESET key is pressed. This reading is held digitally and will not decay and can be held indefinitely.

Once a measurement has been made and a new measurement is required, pressing the RESET key will reset the displayed value so that a new measurement can be made.

Negative peak values can be measured by inverting the Hall Probe.

The GM08 captures the peak value with an analogue Peak Detector circuit. This enables fast transients to be captured and is not dependent upon the conversion rate of the Analogue to Digital Converter circuit. This technique enables fast transients to be captured but without the normal decay of the captured value. This function can be used for capturing transient Magnetic fields such as in Capacitive Discharge Magnetisers.

* Warning - This facility is designed to be sensitive and respond rapidly. It is possible that in electrically noisy environments spurious readings can be achieved. Care should be taken.

Measurements on Capacitive Discharge Magnetisers using Ignitrons may give off such electrical noise.

AC RMS

This function measures the true RMS (Root Mean Square) of an AC Magnetic field.

The measurement is a true RMS measurement but does not include any DC components of the Magnetic field which may be present.

The RMS value displayed is not dependent upon the crest factor limits. This measurement is continuously updated.

AC RMS MAX

This function measures the maximum true RMS of an AC Magnetic field.

The measurement is a true RMS maximum but does not include any DC components of the Magnetic field which may be present.

This reading is updated with increasing measurements. Once a maximum measurement has been reached this value will be held until the RESET key is pressed.

This reading is held digitally and will not decay and can be held indefinitely.

Once a measurement has been made and a new measurement is required, pressing the RESET key will reset the displayed value so that a new measurement can be made.

AC PEAK

This function measures the positive peak value of a time varying AC magnetic field. Negative peak values can be measured by reversing the probe.

This function is a true Peak measurement and does include any DC components of the magnetic field. The AC Peak reading is a continuously updated measurement.

MENU OPTION

UNITS

Tesla, kA/m, Gauss, Oersted.

When the UNITS option is displayed and the ENTER key is pressed the GM08 will display the UNITS sub-menu.

Pressing NEXT will enable the user to move through the Sub-Menu options.

Pressing ENTER will select the displayed Sub-Menu option.

Magnetic Flux Density is measured in Tesla (T), and milliTesla (mT) in the SI measurement system and Gauss (G) and kiloGauss (KG) in c.g.s. measurement system.

Magnetic Field Strength is measured in kiloAmperes per meter (kAmp/m) in the SI system and Oersted (Oe) and kiloOersteds (kOe) in the c.g.s system.

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UNITS SUB-MENU OPTIONS

TESLA

This function enables the GM08 to measure Magnetic flux density in units of Tesla (T) and milliTesla (mT) the standard unit of Magnetic flux density in the SI system.

The measurements taken will be displayed in Tesla (T) or milliTesla (mT) depending upon the operating range.

GAUSS

This function enables the GM08 to measure Magnetic flux density in units of Gauss (G) and kiloGauss (kG) the standard unit of Magnetic flux density in the c.g.s system.

The measurements taken will be displayed in Gauss (G) or kiloGauss (kG) depending upon the operating range.

AMPS/METER

This function enables the GM08 to measure Magnetic Field Strength in units of kiloAmperes per meter (kA/m) the standard unit of Magnetic field strength in the SI system.

The measurements taken will be displayed in kiloAmperes (kA/m).

OERSTED

This function enables the GM08 to measure Magnetic field strength in units of Oersted (Oe) and kiloOersted (k/Oe) the standard unit of Magnetic field strength in the c.g.s system.

The measurements taken will be displayed in Oersted (Oe) or kiloOersted (k/Oe) depending upon the operating range.

MENU OPTION

CAPTURE

Store On, Store Off, Recall On, Recall Off, Hold On, Hold Off.

When the CAPTURE option is displayed and the

ENTER key is pressed, the GM08 will display the CAPTURE sub menu.

This sub menu enables the user to set up the GM08 to SAVE and RECALL from 00-99 samples, or HOLD the current measurement reading.

The samples are stored with full resolution, units and measurement function.

SAVE, RECALL and HOLD functions are mutually exclusive, that is, only one of these functions can be operated at any one time. All options can be selected off.

Any readings stores are retained even after power-down, in non volatile RAM. Stored readings this retained are only cleared using the "SAVE ON" OPTION IN THE capture MENU.

Samples are Time and Date stamped. This is only accessible through the RS232 and is uploaded with the register data when the GMLOAD program is used.

CAPTURE SUB-MENU OPTIONS

SAVE ON

This option enables the GM08 operation to Save measured values in memory locations within the GM08.

The display will show R followed by a two digit number. Pressing the Hall Probe button will now Save the current measurement in a register. The display will show the Register number of the last stored value, ie R15 (or Register No 15).

Samples are saved with full resolution, units and measurement function. Selecting Save On will automatically activate Recall Off.

SAVE OFF

This returns the GM08 to normal operation and terminates the Save operation.

If Save On is re-entered then measurements are saved in the next available location unless Recall has been used, in which case Save data is overwritten. Save Off function is automatic when Recall On is selected.

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RECALL ON

This Option enables the GM08 operation to enter the RECALL Sub Menu Option which enables the GM08 to recall measured values stored in memory locations using the SAVE Option.

The display will show R followed by a two digit number ie R15 (Recall Register 15).

Readings can be saved in one unit and recalled in another - ie saved in Gauss and recalled in Tesla, with conversions taking place automatically.

On leaving SAVE or RECALL functions the stored values will be retained. If the GM08 is switched off all saved measurements will be lost.

After Recall On has been selected (Entered), any further Saved values will be saved from Register 00. Selecting Recall On will automatically activate Save Off.

RECALL ON SUB-MENU OPTION

FIRST

This Option enables the GM08 to recall measurement R00.

NEXT

This option enables the GM08 to recall the next measured value (ie if R00 was displayed, entering NEXT will recall measurement R01). This should not be confused with the NEXT key which is used as normal.

RECALL OFF

This returns the GM08 to normal operation. This terminates the RECALL operation. Selecting Save On will automatically activate Recall Off.

HOLD ON

When this option has been selected, measurement readings can be held by pressing the Hall Probe button once.

The status display will show HOLD. The measurement reading can be released by pressing the Hall Probe button again. The status display will no longer show HOLD.

When a reading is being held it is possible to change units using the Menu Option and the reading will automatically be converted using the Units Menu Option.

HOLD OFF

The HOLD function can be disabled with the HOLD OFF Option in the STORE Sub Menu.

The HOLD function will not operate when the SAVE Option or RECALL Option is in operation.

MENU OPTION

UTILITIES

Null, Auto Zero, Auto Power-Down, Languages.

When the UTILITIES option is displayed and the ENTER key is pressed, the GM08 will display the UTILITIES sub menu. This Sub-Menu contains a number of lesser used options.

UTILITIES SUB-MENU OPTIONS

NULL

This Option enables the Operator to quickly Null (Zero) the GM08 and Hall Probe for all ranges of the current Measurement Function.

When this Option has been selected the Operator is instructed to place the Hall Probe in the Zero Flux Chamber and press RESET. The GM08 then takes approximately 4 seconds to carry out this Null Function.

This Option would only normally be used when sensitive readings are to be taken.

AUTO ZERO

This option carries out an automatic re-calibration procedure on the GM08, this includes a Null function automatically. This process will take approximately 30 seconds.

This process should be carried out when the GM08 has not been used for long periods or at other times when the Operator wishes.

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POWER DOWN

This option enables the GM08 to automatically power down 1,4 or 10 minutes after the last key was pressed. This Option can also be disabled.

The Operator will see a warning message 5 seconds before Auto Power-Down will take place.

Auto Power-Down can be delayed by pressing any of the keys (except ON or OFF), including the Hall Probe button. POWER DOWN SUB-MENU OPTIONS POWER DOWN OFF

This option disables the GM08 from automatically powering down. The GM08 will only turn off with the Operator pressing OFF key, the battery expiring, or the USB cable being removed.

POWER DOWN 1 MIN

This Option enables the Power-Down routine of the GM08 to automatically Power-Down the GM08 after 1 minute from the last key press.

POWER DOWN 4 MIN

This Option enables the Power-Down routine of the GM08 to automatically Power-Down the GM08 after 4 minutes from the last key press.

POWER DOWN 10 MIN

This Option enables the Power-Down routine of the GM08 to automatically Power-Down the GM08 after 10 minutes from the last key press.

LANGUAGES

The GM08 Menu can operate in languages other than English.

By entering the Language Option of the Utilities Sub-Menu, the operator can use the NEXT key to cycle through the Language Options.

To select the required language press the ENTER key. The menu will then operate in that selected language even after switching off the GM08.

HALL PROBE

When measuring a Magnetic Field, the sensitive Hall Element within the Probe must be at right angles to the lines of Magnetic Flux.

In most applications, measurements need to be taken in an air gap where side entry is available. For this type of application a Transverse Probe is used (supplied as standard with the GM08).

In some applications side entry is not available, such as measuring the field inside a Solenoid. In this application, Axial Probes can be used (optional accessory).

The GM08 is supplied with a standard Transverse Hall Probe. The thin semi-flexible Hall Probe incorporates a Gallium Arsenide Hall Element which is encapsulated to make it resistant to damage.

The Transverse and Axial Hall probes supplied for use with the GM08 Hand Held Gaussmeter are very robust compared to the previous generation of Hall Probes.

It should be noted, however, that without due care these probes can be irreparably damaged due to bad handling and incorrect use.

Operators are advised to take due care. Do not disconnect the Hall Probe whilst the meter is ON.

Turn OFF the meter before removing the probe.

AC MEASUREMENT ACCURACY

The GM08 has two standard Probes available. Transverse and Axial.

The GM08 and Transverse Probes are supplied in a calibrated form to give excellent DC and AC measurements.

In the case of the Transverse probe only, this assumes that the AC measurement is applied only to the Hall Probe element at the end of the Hall Probe (as when measuring AC flux density in air gaps).

In order to supply a thin Transverse Hall probe at reasonable cost, the Hall Probe construction includes what is effectively a small single turn inductive loop running the length of the Hall probe flexible section.

When the whole length of the Transverse probe is exposed to an AC field errors can accumulate due to pick up in this inductive loop. These errors are dependent upon the flux linkage through the loop (ie the length of probe exposed to the field)

and the frequency of the alternating field being measured. The greater the frequency the greater the error.

It is therefore recommended when measuring AC fields in the centre of an air-cored solenoid or similar, that an Axial Probe which does not suffer from the effects, is used in preference for both accuracy and physical suitability.

The Transverse probe will not include significant errors when the Hall Probe tip only is subjected to the alternating field.

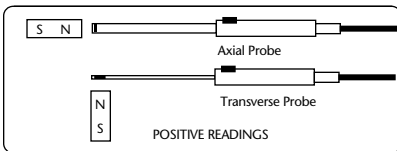
POLARITY

The polarity of a measurement in DC is: DC peak and AC peak readings are positive readings only. Negative readings can be taken by reversing the probe.

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BATTERY REPLACEMENT

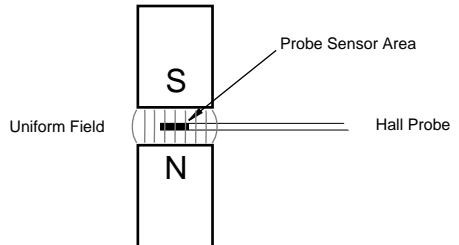
When the batteries have expired it will be necessary to replace them. Firstly, switch off the GM08 and disconnect the Hall Probe.

Remove screw from battery door and remove cover. Remove old batteries and replace. Replace battery compartment door and replace screw.

THE STATUS DISPLAY WILL SHOW A BATTERY SYMBOL WHEN THE BATTERY VOLTAGE IS LOW.

USING A GAUSSMETER

Hall Probe measurements of magnetic flux density (measured in Tesla or Gauss) or Magnetic field-strength (Amp/meter or Oersted) are ideal in applications with parallel fields such as air gaps. The field will be uniform across the air gap and small movements of the probe will give rise to only small changes in readings.



The transverse Hall probe should be positioned in the air gap and angled to give the maximum reading.

If the Hall probe is not at right angles to the magnetic flux a less than maximum reading will be obtained.

The Hall probe should then be moved around searching for the maximum reading.

It should be remembered that this is a maximum reading for one point only. Typical values throughout the air gap may be several % lower.

In many applications a measurement of a permanent magnet is required. The magnet is not in any form of magnetic circuit and may need to be inspected at (say) goods inwards.

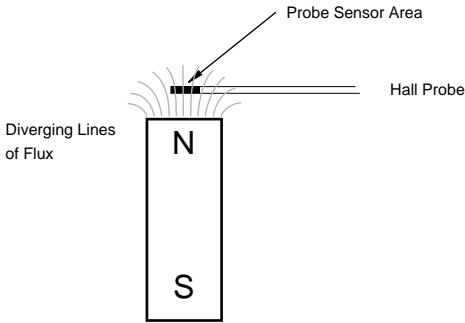
A Hall probe is often used in this type of application and in some cases a Hall probe technique may be stipulated in a specification.

Such measurement should be used as a guide only and not as an absolute measurement. Two perfectly calibrated gaussmeters can be used for such a measurement and show significantly different readings.

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When a magnet, particularly with a small face, is not in a magnetic circuit - the magnetic flux lines will radiate and diverge. Therefore, as the Hall probe is moved closer to the surface of the magnet, the resultant reading will increase. When the probe is in contact with the surface of the magnet, the active area of the probe remains at a distance from the magnet surface due to the probe wall thickness. This is small but finite.

The next probe will have a different thickness of wall and a different reading for the same magnet.

This is why a probe can be turned over and instead of a negative reading of the same value being given, something significantly different can be shown.

Provided that this is taken into account the Hall probes can be used to give a good guide to good and bad parts - but not an absolute measurement.

An absolute measurement for an "Open Circuit" magnet, involves using an Integrated Fluxmeter.

It should be noted that in recent years some suppliers of Hall effect gaussmeters have been advertising them as "Fluxmeters", this is incorrect. Fluxmeters are used in conjunction with a coil to take direct measurements of flux rather than flux density.

Analog Output

The analog output is +/- 3 volts fullscale. Input impedances of attached device should be greater than 100 k Ohms.

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SPECIFICATION

Range 1	0 - 3 Tesla resolution 1 milliTesla	Range 3	0 - 29.99 milliTesla resolution 10 microTesla
	0 - 30 kGauss (kiloOersted) resolution 10 Gauss (Oersted)		0 - 299.9 Gauss (kiloOersted) resolution 0.1 Gauss (Oersted)
	0 - 2387 kiloAmps/m resolution 80 kiloAmps/m		0 - 23.87 kiloAmps/m resolution 800 Amps/m
Range 2	0 - 299.9 milliTesla resolution 100 microTesla	Range 4	0 - 2.999 milliTesla resolution 2 microTesla
	0 - 2.999 kGauss (kiloOersted) resolution 1 Gauss (Oersted)		0 - 29.99 Gauss (kiloOersted) resolution 0.02 Gauss (Oersted)
	0 - 238.7 kiloAmps/m resolution 8 kiloAmps/m		0 - 2.39 kiloAmps/m resolution 160 Amps/m

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

Accuracy (at 20°C)	Better than ±1% (DC) Traceable to NPL Standards
Reproducibility	Better than 0.5%.
Temperature Coefficient	±0.1% of reading/°C including probe
Frequency Range	DC and 15Hz to 10kHz
Averaging Time Constant	100 milliseconds
Operating Temp. Range	0°C to + 50°C
Storage Temp Range	- 20°C to + 70°C
Power Supply	4 x 1.5V, AA Alkaline battery or external power supply +5V to +6V (not supplied)
Battery Type	1.5V AA Alkaline Long life (not supplied)
Battery Life	15 Hours continuous operation. Auto power-down after 1,4 or 10 minutes or disabled all under menu control
Display	120 by 32 pixel graphic LCD
Display Sampling Rate	3 sec approx
Functions	DC, DC Peak, AC RMS, AC RMS MAX, AC PEAK
Facilities	Store and Recall on 0-99 samples
Hold facility	
Analogue Peak with digital storage	
Analogue Output	+/- 3 Volts full scale
USB	1.1 Compliant
Auto and manual ranges	
Automatic reading conversion between different units	
Operating set up at time of power-down is stored and recalled automatically at power-on	
Utilities etc.	
Time Keeping device	GM08 Meter Only
Volatile Memory	
Dimensions	Length 175mm Width 90mm Height 43mm
Weight (inc battery)	400g approx (not including probe)
Standard Accessories	Transverse Hall Probe, Zero Flux Chamber, USB cable and Carrying Case
Optional Accessories	Axial Probe Ref AP002 Replacement Transverse Probe Ref TP002. BNC Adaptor, RS232 lead Reference Magnets Axial and Transverse - see website for details

HALL PROBES

Transverse Probe	Thickness 1mm Width 4mm Length 90mm (not including handle) Length 230mm (including handle) Hall sensor active area 0.2mm X 0.2mm approx Cable length 1.5m Supplied as standard with the GM08 Extra Probe Ref TP002
Axial Probe	Diameter 5mm Length 90mm (not including handle) Length 230mm (including handle) Hall sensor active area 0.2mm X 0.2mm approx Cable length 1.5m (Optional accessories) Ref AP002

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Operators are advised to take due care.



This product complies with the Low Voltage Directive (LVD) and Electromagnetic Compatibility (EMC) directive.

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A ONE STOP MAGNETIC SOLUTION

Problem solving is in our DNA, give us a call and we'll be happy to have a chat to see how we can help.



Magnetisers, demagnetisers and calibrators



Helmholtz coils and fluxmeters



Bespoke production systems



Magnet characterisation equipment

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