MPI
Magneti Permanenti Industriali

USER MANUAL

Digital Gaussmeter

GS20

User Manual

BEFORE USING GS20 DIGITAL GAUSSMETER READ CAREFULLY THIS MANUAL

USE OF THE MANUAL

The user manual is a document accompanying the equipment since its construction until its dismantling and form an integral part thereof.
It must be read before any activity with the team.
This manual is an integral part of the equipment and must be easily accessible to the staff responsible for the use and maintenance.
The operator and the maintainer are required to know the contents of this manual.
Maintaining the essential characteristics of the equipment described, MPI reserves the right to make any modifications to the components, details and accessories that make it appropriate for the product improvement or requirements of manufacturing or commercial reasons, at any time and without any commitment by their part to update this publication.

Introduction

The *Gaussmeter* is a special instrument used for inspecting and checking flux density, and is also one of the most universally used devices in the field of magnetic measurement. The GS20 Digital Gaussmeter model is controlled by the SCM Microcontroller. It is suitable for operation by hand.
It can be used to measure the DC or AC magnetic field and flux density. It is an easily portable device. It is characterized by its wide measuring range, simple operation and clear display. As a special function, the Measurement Values/Peak Values can be stored. The mT or Gs units of the display can be interchanged. Measuring ranges of 200mT or 2000mT can be chosen, and other features such as resetting to zero by key, etc.
The power source is a single 9V battery. It can be used continuously for about 20 hours.

Uses:

1) Distribution of the magnetic field across material surfaces.

2) Working magnetic field produced by various instruments such as iron-removing devices, magnet-selecting machines, magnetic chucks, magnet-chargers, demagnetizing coils, microwave ovens, electric welding equipment, electric motors etc.

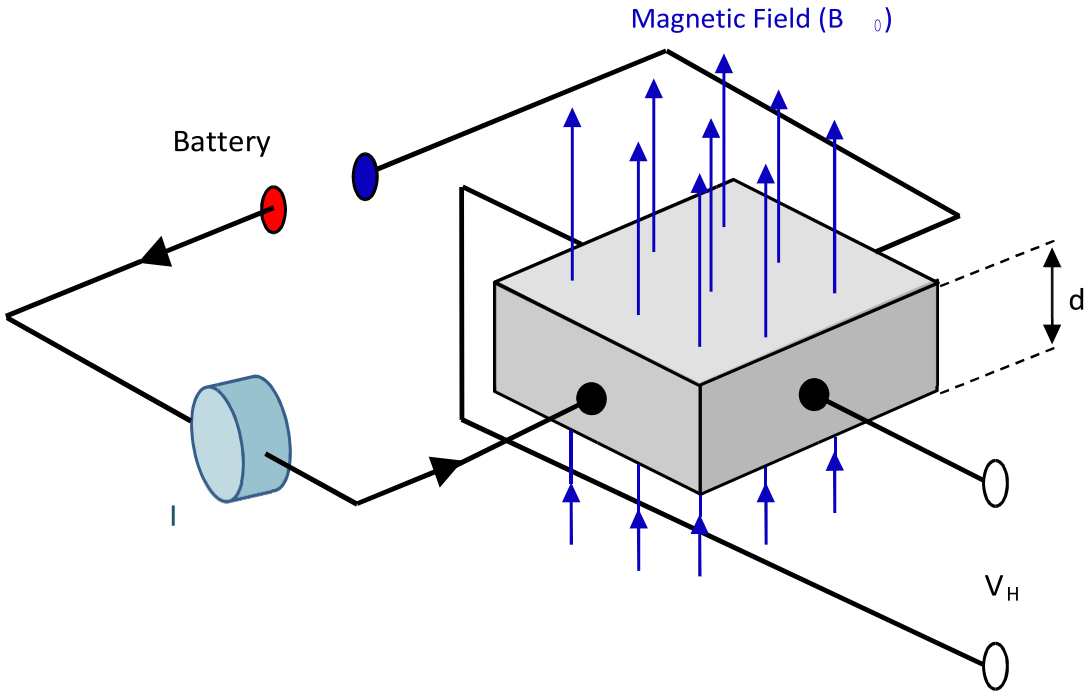
3) Magnetic Leakage iron-surface.

4) The magnetic field within gap structures.

WORKING PRINCIPLE

This series of instruments uses sensors which are made according to the Hall Effect. The circuit works on a precise constant current source, an amplifier with low drift and high stability power supply. It is controlled by the SCM. Measured values are displayed by digital voltmeter with a 4½ LED.

1) The principle of Hall Effect:



When placing the semiconductor carrying current in the magnetic field axial to the current direction, the semiconductor will generate a transverse Galvanomagnetic phenomenon, namely an electromotive force in the direction axial to the magnetic field and current, which is the Hall Effect.

Hall Effect can be explained with classical Galvanomagnetic theory.

Generally, Hall voltage V_H is expressed as:

$$V_H = I\frac{R_H B_0}{d} = IR_{HI}B_0$$

Of which:

d	The thickness of the Hall device.
R_H	Hall constant.
$R_{HI}=\frac{RHI}{d}$	Constant of the Hall device.
I	Current intensity passing through the Hall device.
B_o	The measured magnetic induction intensity.

It can be seen from the formula: For a certain Hall device, the magnetic field **B_o** can be indirectly measured through measuring the Hall device if the passing current I is constant.
Since it can count continuously and linearly with a simple method and long service life when measuring the magnetic field with Hall Effect and can measure the magnetic field of small spaces and small gaps, the Hall Effect Method has become an important method for magnetic field measurements.

- **Method of Operation of the Sensor**

The Hall Plate shall be placed axially to the direction Magnetic Line of Force of the measured Magnetic Field when measuring.

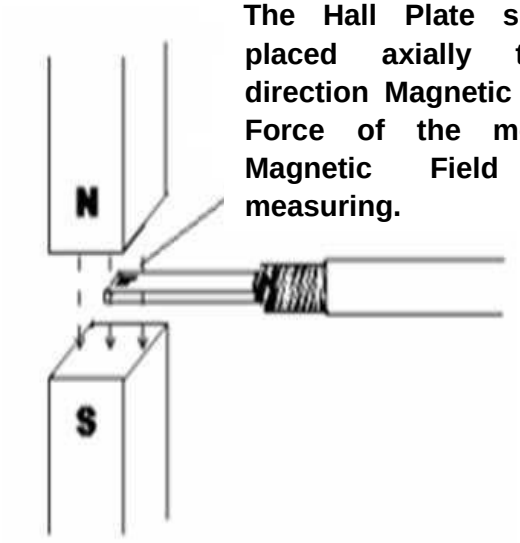


Fig. 1: Transverse Probe

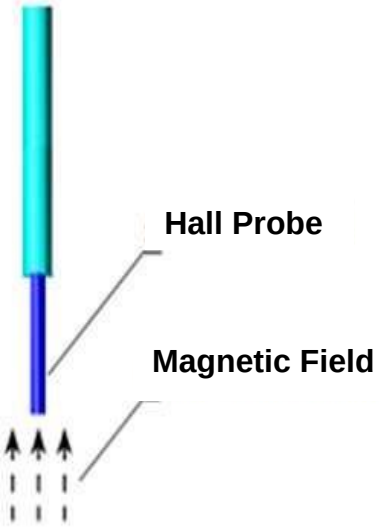
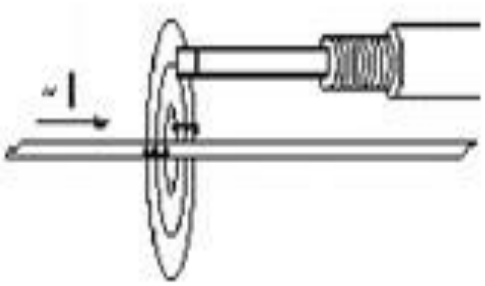


Fig. 2: Axial Probe

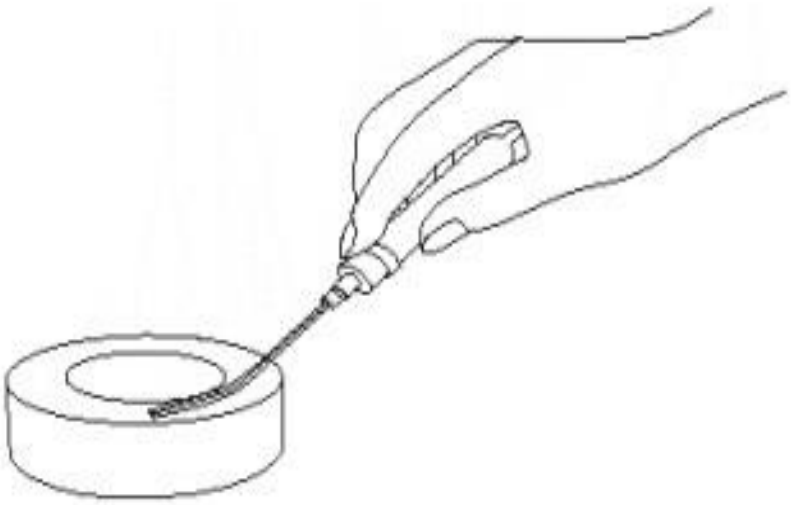
Note:
The element sensitive to the magnetic field are located at the front end of the probe. For surface magnetic field measurement, the side without scale of the transverse probe shall be used to make contact with the magnet surface and the front-end side of the axial probe shall be used to make contact with the magnet surface. Under such circumstances, the probe surface will suffer wear and tear.
The connecting cable of the probe should not be kneaded or pulled forcibly, the probe bracket should not be mistreated and the probe lead wire and welding spot should not be left in contact with other conductors or in a short circuit.

a) Illustration of measuring field.

Illustration of measuring field (see fig. below), holding the sensor, (not on the staff gauge side), lightly touch the surface of the object to be measured.



b) The wrong method of holding the sensor.
The top of the sensor should not be forcibly bent to touch the surface of the object to be measured. (As Fig. below) The sensor will easily be damaged



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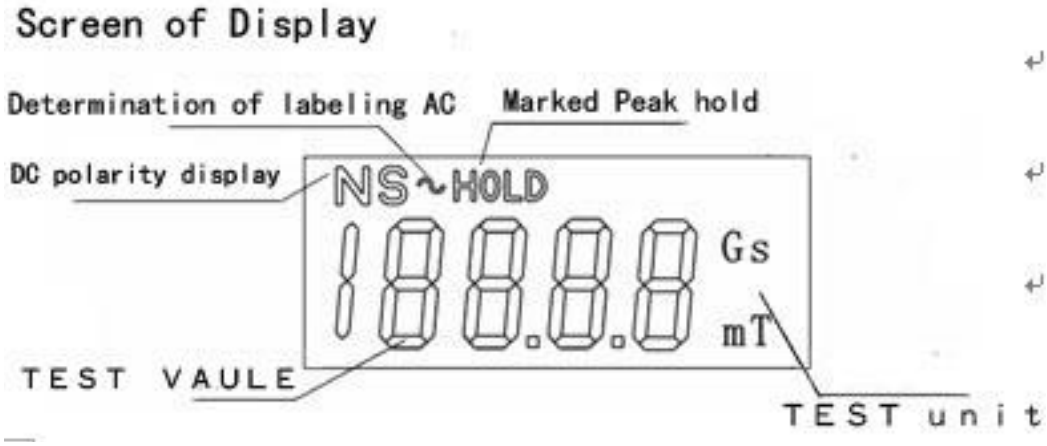
Range	0~200mT~2000mT
Accuracy	±2%, ±3 digit; ±5%, ±5 digit (1000mT)
Sensitivity	0.01mT - 0.1mT
Measured magnetic field	AC/DC
Application Examples	Magnet surface magnetic field, ferromagnetic material surface magnetic field, DC motors, speakers, magnetic separator, permanent magnetic separator of the surface magnetic field, the exchange frequency magnetic field, magnetic field induction cooker work.
Frequency magnetic field	CC~200Hz
Temperature of environment	5°C~40°C
Relative humidity	20%~80% (senza condensa)
Power supply	Batterie 9V o fonte esterna di corrente continua da 9V
Dimension	150mm (L) x 70mm (W) x 25mm (H)
Weight	Peso netto 400g, peso lordo 900g
Display	4 ½ LED

INSTRUMENT FUNCTION KEYS:

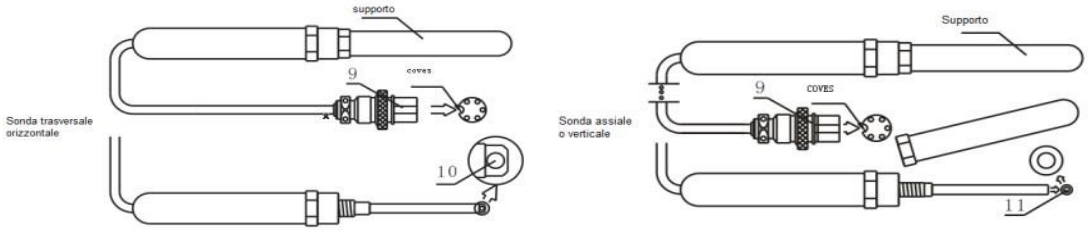


Power On/Off (2)
Zero/Reset Reading (3)
Peak Hold/Real value switch (4)
Range Change (5)
DC/AC Switch (6)
mT/Gs Unit change (7)

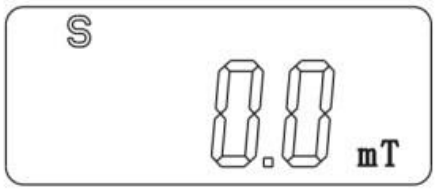
Manipulation Procedure

1. Insert the 9V battery into the connection in the back of the instrument; if an external power supply is used, connect it's terminal to the socket which is in the side of the instrument and connect it's plug to the electric supply.

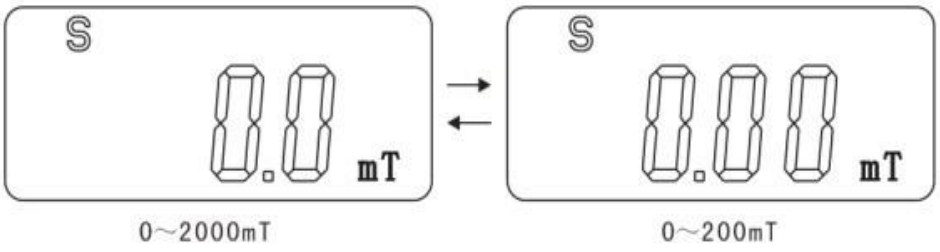
2. Insert the Hall probe (9) into the socket on the panel (8) (according to the arrow marked on the sensor).



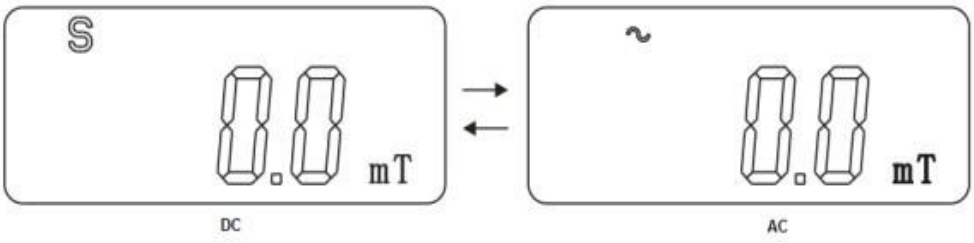
3. Press the Power On/OFF key in the panel and the digital display screen should display Zero.



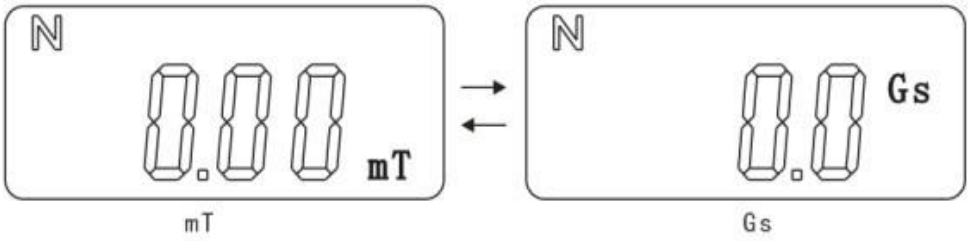
4. Select a suitable measurement range. Press the key RANGE switchover again and again, the measurement range should be transformed within 0~200 mT or 0~2000 mT.



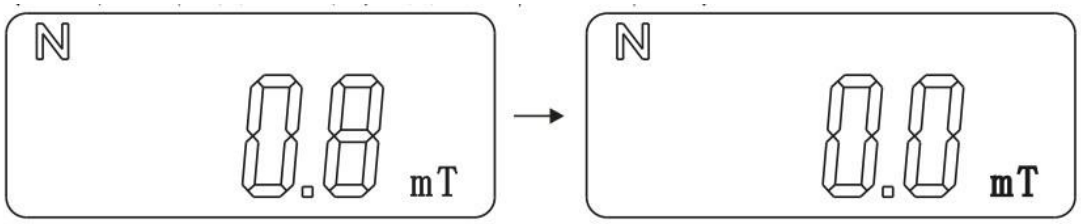
5. Selecting DC/AC mode.
   Press the key DC/AC switchover again and again , the DC/AC mode would be selected.



6. Selecting the unit of display. Press the key (7) of conversion, the display unit should be transformed from mT to Gs.

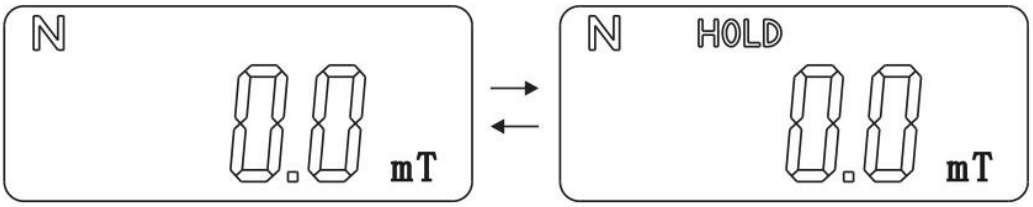


7. Resetting zero. Keep the sensor as far away as possible from the magnetic field.
If the display screen does not show “000”.you must press the key (3) to adjust it to zero.



Note: Afterwards, change the measurement range or transform the AC/DC mode, you all need to reset zero.

8. Measurement of Peak-value holding: Press the key (4) to change from normal measurement to Peak-value holding.



9. Loosen the cap of the Hall probe (see upper Fig). Place the Hall probe touching the surface of the material tightly (DC magnetic field) or at the zone of the measured magnetic field. The screen (1) will show the value of the magnetic field.

10. Important: Reset Peak-value holding after recording the Peak-value holding value, but it is necessary to measure a new peak value and the forecast value will be lower than forecast. Thus, you could press the Reset button (4) to show the new peak value.

11. On finishing measurements, the cap should screwed on. It may be better to remove the battery from the case to prolong its life.

12. The Hall probe can be replaced. The difference to the original probe to others is 2%.

Note: 0.1mT = 1 G → 1T = 10000 G

MAINTENANCE AND NOTES

1. To check the status of measuring, if the instrument cannot be adjusted to zero or has no display values, the power supply should firstly be checked if correct. Then check whether the probe is normal or damaged. If the connecting wires are ruptured they can be connected according to the correct figuration: Terminal 1, 2 are current, No. 4 and No.5 are terminals for voltage.
   If no damage is found, please return it to our company. The circuits may be faulty.

2. The probe should not be forced, cracked or squeezed.

3. While adjusting to zero, the probe should be placed as far away as possible from the magnetic field, to avoid measurement error.

4. The instrument is guaranteed to for 12 months, excluding the probe.

5. Do not use the instrument in inappropriate conditions.

6. If you find the testing values are incorrect when measuring, you can unscrew the handle of the probe to make adjustments.

7. Do not attempt to repair, or disassemble, or reconstruct this instrument.

8. Use only recommended power accessories.

9. Don’t connect the terminals of the outer power supply reversely. The inner terminal is plus, the outer is Minus.

10. Don’t drop this instrument or the probe on the ground. It will be damaged by strong vibrations.

11. Do not touch the probe with dirty hands or other contaminated objects.

12. Avoid using, placing or storing the instrument in places subject to strong sunlight or high temperature, also humidity, water, oil, rust, air, vibration, etc.

13. Use or store within the temperature ranges indicated.

14. Do not move the instrument rapidly between hot and cold temperatures, to avoid condensation.

15. Never place the instrument close to a machine generating strong magnetic fields and to demagnetizing coils.

16. Lastly, we suggest you calibrate the instrument periodically.

WHOLE SET OF THE INSTRUMENT

1. Model IMAGS20 Digital Gaussmeter 1 pcs
2. Instructions for use 1 pcs
3. Product Certificate 1 pcs
4. Probe 1 pcs
5. DC9V Supply 1 pcs
6. 9V Battery (6LR61 or 6LF22) 1 pcs

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