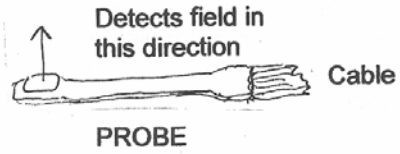
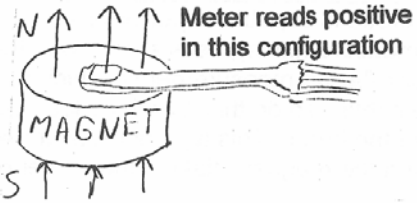
AlphaLab DC Magnetometer

This magnetometer (gaussmeter) measures magnetic flux density from -19,999 to +19,999 gauss (1.9999 tesla) and it indicates the polarity (negative if the "minus" sign is present). This is sufficient range to measure even the strongest permanent magnets.

BASIC OPERATION

To operate, plug the sensor cable into the box. Magnetic field is a vector, which means it has both a strength and a direction. This meter will only read the correct number if the (1-axis) probe tip is oriented properly, so that it captures the full field strength.* If pointed in the wrong direction, it will read less than the full field strength. This is not usually a problem when measuring magnets. When the probe is laid on the face of a north or south magnet pole, the direction of the field from the magnet is the same as the direction of the probe.





Most measurements will be done with the range knob set at "19,999" or "1999.9". If the display shows just a "1" or "-1" on the left, it is over range, so switch the range knob to a higher number. There is no permanent magnet material or configuration that can produce a field higher than 19,999 gauss, which is the highest range. The actual Hall-type magnetic sensor is .6mm below the center of the bulge on the top surface of the probe. (This "top" surface is shown on the left illustration above. In contrast, the "bottom" surface has no bulge). Its area is .2 x .2mm.

OFFSET

You may want to cancel out the existing field by adding or subtracting a certain value from the field strength. You may also need to adjust OFFSET to get a correct zero-field reading on the probe before you begin making measurements. These can be done with the OFFSET control (the aluminum shaft) which adjusts offset by about +/- 10 gauss, or the coarse offset control (a recessed rotary potentiometer, which is near the cable socket). The coarse offset can be adjusted by about +/- 50 gauss with a small Phillips screwdriver (supplied under the foam in the box).

In general, for proper zero, point the sensor (that is, point the arrow shown on the above left illustration) toward the east or west. Adjust the OFFSET (and also the coarse offset if necessary) to read zero. (This is not a very important adjustment if you will only be measuring strong magnets.)

MEASURING WEAK FIELDS

For finer measurements such as variations in the Earth field, switch to the 199.99 range. Then this OFFSET adjustment must be done. Note that the 199.99 range is passed through a slow filter so it requires at least 3 seconds to settle. Even with the filter, there is still some jitter in the reading at this range, so it is not possible to get a perfectly stable zero. If the OFFSET is correct, it will read a certain number when laid flat on a (non-magnetic) table, and it should read the negative of that number when flipped upside-down and then laid flat on the same table. This negative-positive test is mentioned because East (or West), used to perform the OFFSET, may not actually be a zero-field direction due to distortions in the Earth field.

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* Technically, gauss and tesla are units of "magnetic flux density", not "magnetic field strength". However, the phrase "field strength" will be used here when talking about gauss. See www.trifield.com for more explanation.

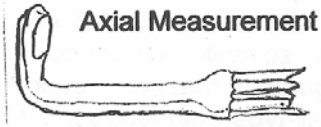
POLARITY

When the bulge on the probe is pointed toward a south pole of a magnet, the meter reads positive; when pointed toward a north pole, it reads negative. Oddly, if you face the Earth magnetic north pole, you're looking into the south pole of a magnet (which attracts the north pole of a compass needle or magnet). The north pole of the earth is not horizontal in most locations. In most of Asia the magnetic field direction is within about +/-20° of horizontal. In North America if you face north and then look downward from horizontal 20° (Central Mexico) to 55° (Northern US) to as much as 90° down in parts of Canada, that is the direction of magnetic north. You can detect the field strength and direction with the meter. Note that with the bulge in the probe pointing toward the Earth north, you will read a positive number, because it's pointing toward the south pole of a magnet.

AXIAL VS TRANSVERSE MEASUREMENT

The standard probe is capable of performing measurements perpendicular to the cable direction ("transverse" measurements), as is shown with the arrow in the left illustration on the first page. It can also perform "axial" measurements, which are required when the field direction is parallel to the majority of the cable. To do this, bend the last 1/4 inch of the probe as shown, with the bulge facing on the inside of the bend. This type of measurement is less common than transverse, and is required when measuring the magnetic field in the center of a long solenoid or electromagnet.

Magnetic Field →



Axial Measurement

Probe can be bent as shown and back to straight thousands of times.

SPECIFICATIONS:

Range is +/-19,999 gauss. Overall accuracy: +/-2% in the temperature range 30°F-110°F. 4 1/2 digit display. Minimum usable resolution 1 or .1 gauss in the fast ranges (19999 and 1999.9 respectively) and .02 gauss in the slow range (199.99). Requires a 9-volt battery. The display shows "LOW BATTERY" when approximately 1 hour of battery time is left.

One year warranty.

Made by AlphaLab, Inc., 1280 South 300 West, Salt Lake City, UT 84101.
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