AlphaLab, Inc.

Serial #M1HS152

Certification

This AlphaLab, Inc. High Stability DC Gaussmeter Model 1-HS is certified to display magnetic flux density in one axis with a scaling accuracy of +/- 2% over the temperature range of 30 degrees to 110 degrees Fahrenheit in the dynamic range of 0 to +/- 799.99 gauss. Accuracy of absolute zero field level is determined by the user when setting the "OFFSET" control. The linearity over the +/- 799.99G range is +/- 0.2% and this unit was calibrated with a current-proportional Helmholz coil calibrated against a Magnetic Instrumentation Inc gap magnet of 1000 +/- 5 gauss, with maximum thermal coefficient .02%/°C. The gap magnet was calibrated on 27 Oct 2008. This meter is traceable to NIST standards. This equipment has been calibrated in accordance with ANSI/NCSL Z540-1-1994. This calibration is valid for 10 years.

Ambient conditions during calibration were temperature 23° +/- 1°C, RH 40% +/- 5%.

Calibration of this High Stability DC Gaussmeter Model 1-HS performed by:

Tarik Dzumhur — 13 Jan 2010

Tarik Dzumhur
AlphaLab Inc.

Date

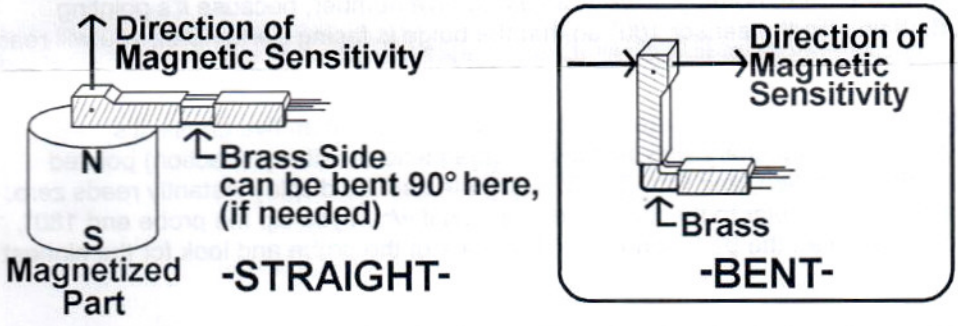
3005 South 300 West
Salt Lake City, UT 84115
Phone: (801) 487-9492
Fax: (801) 487-3877

AlphaLab DC Gaussmeter Model 1-HS

This magnetometer (gaussmeter) measures DC magnetic field (with polarity) up to + or - 799.99 gauss.

OPERATION

Turn the meter on. Note that the last few millimeters at the (black) end of the probe has a square bulge on one side; the other side is flat. Note also that a small section of brass is visible about 15mm from the tip. The brass is on the "flat" side. The center of that square bulge is the location of the Hall-Effect sensor, which is very small (0.2 x 0.2 mm). Place the flat side of the probe's end (not the square bulge side) against the surface to be measured. A negative sign indicates that the probe is touching the south pole of a magnetized object; in contrast, a north pole will read positive ("positive" is indicated by the *absence* of a polarity sign on the display). The actual center of the sensor is 1.1mm above the flat surface or 1.0mm below the top of the square bulge) and is centered in the center of the square bulge.



Below 10 gauss, only three digits (such as "-0.37") will be displayed. For stronger fields, more digits will appear. For fields stronger than +/- 799.99 gauss, the extreme left digit will display. (It is a "1"). If the display reads "LO BATT", there is about one hour of battery life remaining. Remove the soft bumper or "boot" if present, and then slide off the battery door on the back side. Replace with a common 9-volt rectangular battery. Alkaline is preferred. The old battery can most easily be removed by holding the meter so that the battery can fall out, and then tapping the meter on a table. Current drain is 12ma and the LO BATT reads if battery voltage remains below 7V for at least one minute. (Accuracy errors will occur below battery voltage of 5.8V).

OFFSET ADJUSTMENT (only necessary if measuring weak fields)

The OFFSET knob allows you to add or subtract up to four gauss to or from the displayed number of gauss. This feature is used if you are holding the sensor in a certain orientation in space, and you want the display to show "zero", even though some field is present. Then you can bring in a magnetized object to measure. This is the magnetic equivalent of adjusting the "tare" weight of a weight scale, because there may be an ambient magnetic field that you'll want to subtract out. If the OFFSET knob is at center, the display will read approximately zero in zero field, but you can more precisely adjust the offset to zero if you do one of two things, either:

1) Place the sensor in a "zero gauss chamber" (not supplied with this meter, but see www.trifield.com) and then turn OFFSET until the display shows a zero reading.

2) Place the sensor end flat on a non-magnetic table or desk with the square bulge facing up. In this orientation, the meter will read the upward-pointing component of the magnetic field. (If the field is instead *downward*-pointing there, the meter should then read a negative number.) Note the number on the display. Then flip the sensor so the square bulge is facing down. This 2nd reading should be the *negative* of the 1st reading. That is, if the 1st reading was –0.40 (gauss), then the 2nd should be 0.40 (gauss). If the two readings are not the negative of each other, then the OFFSET is not adjusted perfectly for a zero reading in zero field. For example, if the 1st reading is 1.00, and the 2nd reading is 0.00, then the OFFSET is off by 0.50 gauss (the average of the two readings). Adjust the OFFSET knob so that the 1st and 2nd readings are the same number but of opposite sign.

MEASUREMENTS

This type of meter is often used to check residual (accidental) magnetization of parts. In general, this accidental magnetization is *perpendicular* to the surface of the part, so the probe can be placed flat against the part, and this is the correct direction for detection of that field. You may need to scan the probe across the surface to find the highest number. This highest reading is usually found at the ends or sharpest points of the part.

There are some peculiarities of measuring residual magnetization. Long, thin steel parts will often "amplify" the Earth field by a factor of 10 or so, at the ends of the part. If the long-axis of the part is pointed east-west, or perpendicular to the local indoor field, this is not a problem. The strength of the Earth field is about 0.5 gauss, so you may see up to about +/-5 gauss at the end of a properly *demagnetized* steel rod if the rod is pointed in the direction of the Earth field. 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 negative number, because it's pointing toward the *south* pole of a magnet. If you flip the sensor 180° so that the bulge is facing Earth north, you will read a positive number.

When scanning the surface of parts, if you want to measure with a resolution of less than five gauss, it's recommended that you keep the probe end stationary with its thin axis (magnetic sensitivity direction) pointed perpendicular to the local magnetic field direction, and with OFFSET adjusted so the display instantly reads zero. You'll know it's correctly zeroed and perpendicular to the local field direction if when you flip the probe end 180°, the display continues to read zero. Then scan the part along the flat surface of the probe and look for the highest number (either positive or negative).

SPECIFICATIONS:

Range is +/-799.99 gauss. Overall accuracy: +/-2% in the temperature range 30°F-110°F and +/1% in the temperature range 60°F – 85°F. The display is 5 digits (+ to –69,999 counts). Minimum usable resolution is 0.01 gauss. Requires a 9-volt battery, which is good for about 40 hours of run time. The display shows "LO BATT" when approximately 1 hour of battery life is left. Recalibration is not necessary in a period of less than 10 years from original calibration.

One year warranty. Made by AlphaLab, Inc., 3005 South 300 West, Salt Lake City, UT 84115. 1-801-487-9492