MULTI DIMENSION
Sensing the Future

CAL01 – CALIBRATION MAGNET

Features and Benefits

- High Field Magnetometer Calibration
- Calibrates Transverse and Axial Probes
- High Degree of Stability
- Accuracy Retained Between 0 °C and 40 °C
- Durable Nylon Housing
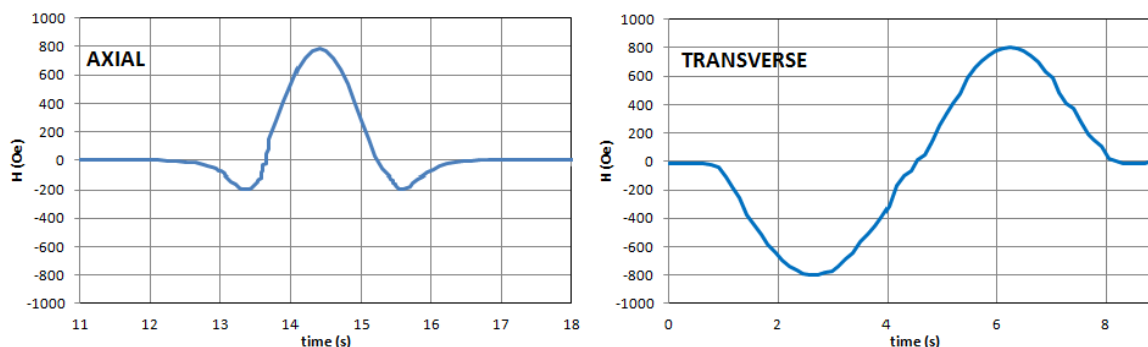- Special Field Values Quoted on Request

Applications

- USB2510x Magnetometer Calibration
- STEM Education
- Hobby and DIY

General Description

The CAL01 reference magnet provides a stable and convenient method to verify the accuracy and calibration of the USB 2510x series magnetometers. The CAL01 reference magnet is composed of two axially magnetized permanent magnet rings that allow a probe to access the working region of the fixture from both axial and transverse orientations, making the calibration fixture useful for both axial and transverse probe calibration. Unlike conventional reference magnets that rely on placing a probe in a fixed position, which produce an error if the magnet hole is improperly sized or the probe is not shimmed correctly, the CAL01 is designed so that magnet can be moved with respect to the probe in order to allow the user to find the positive and negative peak magnetic field values, which are used to compute the calibration factors. When used in combination with MultiDimension's graphical data logging user interface, this technique minimizes errors from probe misalignment and permits rapid accurate calibration of the USB2510x magnetometer probes. The plots below show the peak field values when moving an axial probe through the axial hole and when rotating the magnet around a transverse probe in the transverse hole.

CAL01 IS NOT FOR USE WITH THE USB2705x/2102x MAGNETOMETERS!

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Hardware Description

The CAL01 reference magnet is composed of two axially magnetized permanent magnet rings that allow a probe to access the working region of the fixture from both axial and transverse orientations, making the calibration fixture useful for both axial and transverse probe calibration.
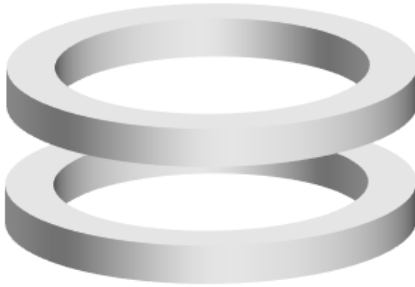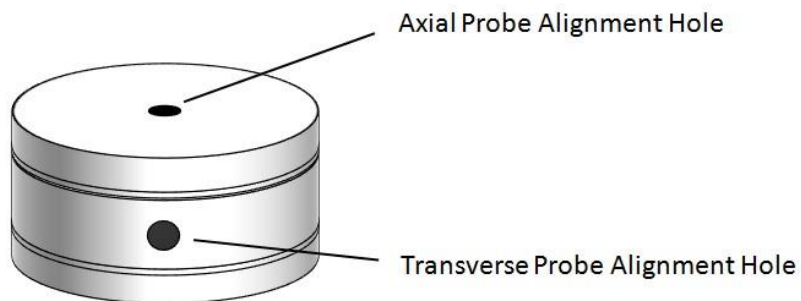

This forms a region of uniform magnetic field between the rings, where provided the motion of the probe is confined to this region, provides a well defined peak magnetic field value.
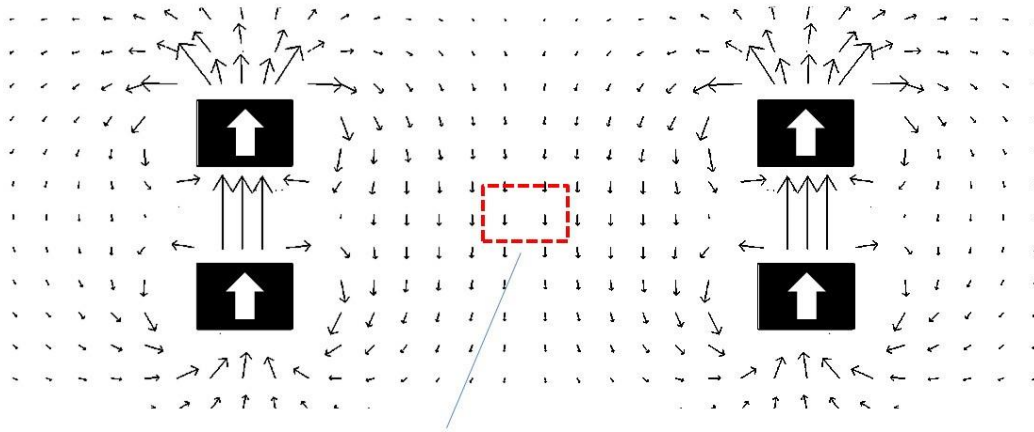

Sensor calibration area

The housing of the magnets is composed of nylon, and it has guide holes for inserting the probe.

Axial Probe Alignment Hole

Transverse Probe Alignment Hole

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Transverse Probe Calibration Procedure

1. Press the "calibrate to field" button.
2. Set the calibration field value to the magnetic field value indicated on the side of the calibration assembly
3. Make sure both sensitivity and offset checkboxes are selected
4. Insert transverse probe all the way into the transverse probe alignment hole.
5. Reset the chart in the calibration window
6. Rotate the magnet in order to sample the largest positive voltage and the largest negative voltage. The probe can be wiggled and the magnet rotated back and forth around the field extrema angles in order to sample the maximum and minimum values.
7. Save the calibration in either the flash for future use or just write the calibration to the sensor for immediate use only
8. Exit the calibration window
9. Enter the digitizer window and turn on the low pass filter (LPF) if desired.
10. If the offset has not been adequately corrected, then perform one of the offset calibration procedures
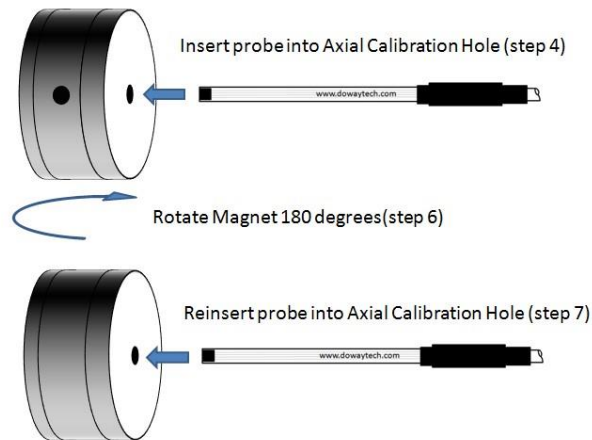
Motion of the Magnet and Probe
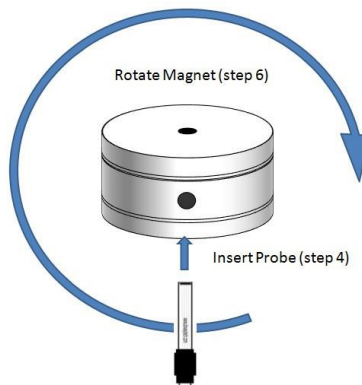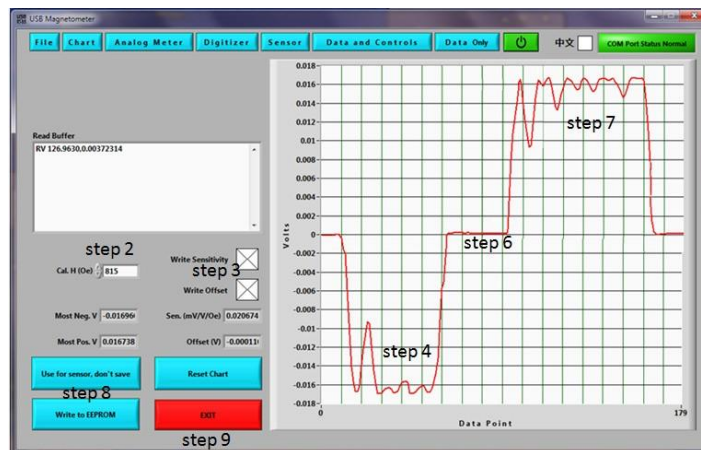

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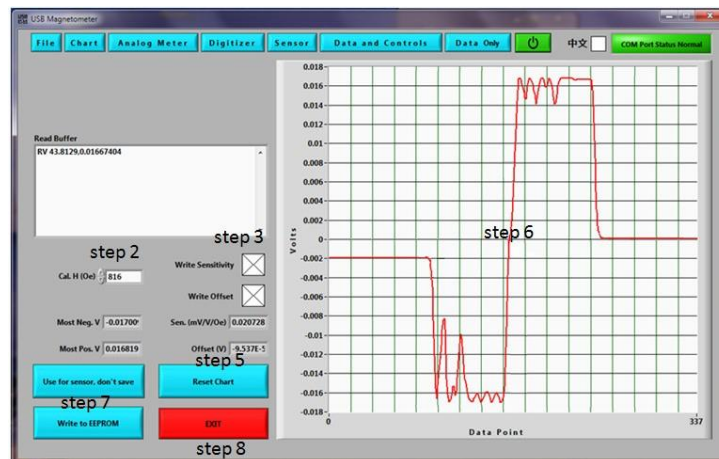
Axial Probe Calibration Procedure

1. Press the "calibrate to field" button.
2. Set the calibration field value to the magnetic field value indicated on the side of the calibration assembly
3. Make sure both sensitivity and offset checkboxes are selected
4. Push the axial probe into the axial alignment hole to find the maximum positive (negative) voltage reading, you can wiggle the probe some and move in and out of the calibration assembly to verify the maximum value has been sampled.
5. Hold the probe steady and pull the calibration assembly away.
6. Flip the calibration magnet in order to reverse the magnetic field
7. Push the axial probe into the axial alignment hole to find the maximum negative (positive) voltage reading, you can wiggle the probe some and move in and out of the calibration assembly to verify the maximum value has been sampled.
8. Save the calibration in either the flash for future use or just write the calibration to the sensor for immediate use only
9. Exit the calibration window
10. Enter the digitizer window and turn on the low pass filter (LPF) if desired.
11. If the offset has not been adequately corrected, perform one of the offset calibration procedures

Motion of the Magnet and Probe

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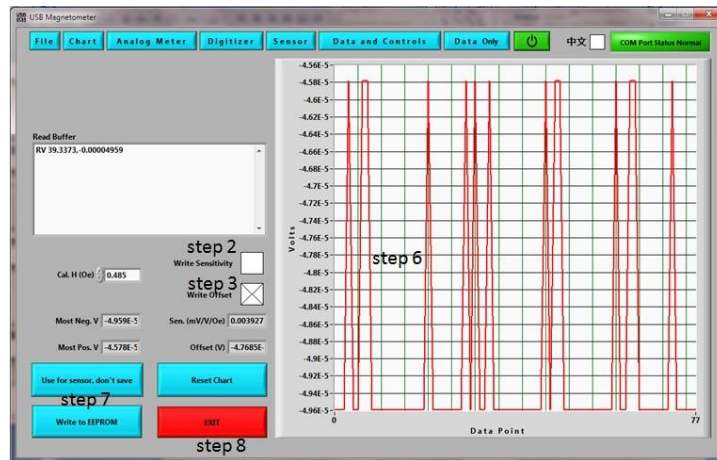
Offset Calibration Procedure

There are several methods that may be used.

- Autozero the probe with the sensing axis aligned east-west
- Autozero the probe inside a zero gauss chamber
- Manual offset
- Calibration method to permanently change the offset

Calibration Method

1. Press the "calibrate to field" button.
2. Make sure the sensitivity checkbox is not selected
3. Make sure the offset checkbox is selected
4. Place the sensor in a zero gauss chamber OR align the sensing axis along the east-west direction
5. Reset the chart in the calibration window
6. Acquire several seconds of voltage vs time data, verifying that the background value is stable
7. Save the calibration in either the flash for future use or just write the calibration to the sensor for immediate use only
8. Exit the calibration window
9. Enter the digitizer window and turn on the low pass filter (LPF) if desired.

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