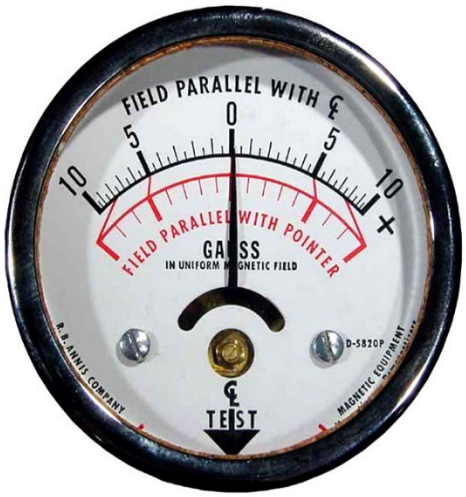
NDT MAN's Notes on Gauss Meters:

R.B. Annis Gauss Meters are used to measure only residual magnetism.

The following should be noted:

- All R.B. Annis Gauss Meters are "Calibrated" with a sticker on the box, not on the gauge. They do not have a serial number or certification documents. R.B. Annis charges extra for Serialization and Certification.
- The sensor in these gauges is approximately located at the Zeroing Screw Adjustment which is 16mm (0.64") from the surface of the gauge.
- Different calibrated gauges will measure differently. The reason for this is that the gauges are calibrated in a Hemholtz Coil. This means that they are calibrated in air – with no reference to the test materials surface.
- R.B. Annis Gauss Meters will measure very low compared to a Gauge with a Tangential Field probe that measures closer to the materials surface.



16 mm/ 0.64"

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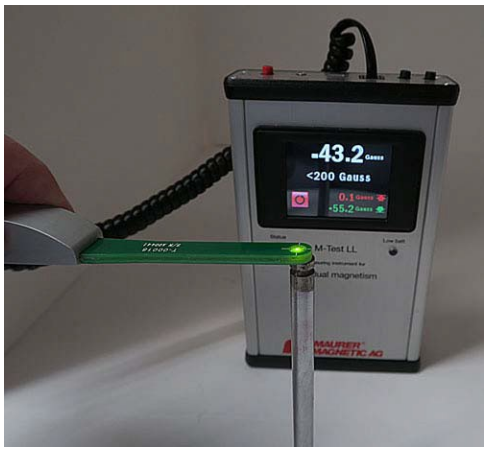
Measuring Residual Magnetism with common Gauss Meters

This valve stem looks to be properly demagnetized with a peak Gauss Reading of 2.

What few people know is that the sensor in this type of Gauss Meter is located 16mm (0.64”) from the surface on the meter.

The below statement is taken from the manufacturer’s certification document: “All moving-magnet type gauss meters measure magnetic field intensity at the movement staff location, which (on Model 25) is spaced 16 mm away from the test edge of the meter case.”



The Maurer M-Test LL‘s sensor is located only 0.5mm (0.020”) from the probes surface. You can see from this photo that the actual peak Gauss reading is 43.2. A considerable difference!

This point is commonly misunderstood. The RB Annis Meter is in-fact calibrated and accurate, but it simply does not measure where you think it does, or where you need it to measure – on the surface of the part.

It takes about 20 Gauss to pick up a paperclip

Iron Particles attracted to the “demagnetized” valve stem

RB Annis Model 25 Residual Field Indicator

The residual magnetism in a workpiece can be checked e.g. after magnetic particle crack detection. As well the position and polarity of magnetic poles can be identified. Residual Field Indicators are very sensitive to small changes of a magnetic field. Therefore, they are best suited for comparative measurements, i.e., to distinguish between sufficiently and insufficiently demagnetized parts.

Description: A small magnet, to which an external magnetic field exerts a torque, is mounted onto the revolving axis of the instruments pointer. Another magnet inside the housing keeps the pointer in zero position as long as no external magnetic field is present. The magnetic field intensity is measured at the movement staff location, i.e. on the axis where the revolving magnet is mounted: 16 mm apart from front and rear side of the housing. The axis of the pointer is 16 mm apart from the bottom side of the housing, where the "TEST" mark indicates the edge which should be in contact with a workpiece when using the Residual Field Indicator. One end of the pointer axis is visible through the glass.

The Residual Field Indicator is equipped with two scales. The upper black scale reads directly in gauss of a uniform magnetic field oriented parallel with the centerline of the instrument scale and the "TEST" arrow. The lower red scale is used to determine the magnitude and direction of an unknown magnetic field by merely orienting the instrument for maximum reading. At such a maximum reading the direction of the field is parallel with the instrument pointer and the magnitude can be read in gauss on the red scale. A (+) deflection of the pointer indicates the TEST edge of the Residual Field Indicator has been presented to a magnetic North pole, a (-) deflection, that is has been presented to a magnetic South pole. (Hint for the earth magnetic field: The geographic North pole is from the magnetic point of view a South pole.)

RB Annis Model 25 Residual Field Indicator

Application: To check for residual magnetism place the Residual Field Indicator with its TEST edge (s. illustration) onto the workpiece. Find magnetic poles and residual magnetism by moving the instrument slowly over the surface and observing the deflection of the pointer.

Care should be given to that the pointer is always moving within the range of the scale. If, with strong residual magnetism the pointer is going off scale withdraw the instrument from the surface until the pointer reads within the scale again.

When a position of strong residual magnetism is found on the workpiece, it is recommended to tilt and turn the instrument in order to get maximum readings.

Influence of the shape of a workpiece: Point-like or line-shaped magnetic sources – i.e., the ends, edges or grooves of a workpiece – cause non-uniform magnetic fields whose magnitudes decrease rapidly with distance. The Residual Field Indicator measures the magnetic field inside its housing at a distance of 16 mm from the "TEST" edge. Therefore, the field shown by the pointer will always be smaller than the actual field close to the surface of the work- piece. If accurate measurements close to the surface of the workpiece are necessary, we recommend a meter with a Tangential Field Probe. The thinner the probe the truer the measurement will be to the actual flux at the surface of the material.

Residual Field Indicators of different manufacturers are likely to show different indications – except in the case of a completely uniform magnetic field, like a Hemholtz Coil. This is due to different mechanical and geometrical setups of different models. Therefore, Residual Field Indicators are only suited for comparing purposes, especially for finding different degrees of demagnetization with geometrically identical work- pieces.

Accuracy, The accuracy in a uniform magnetic field is given as ± 10 % of full scale.

Temperature Range: The allowed temperature range is: 2 °C - 20°C. 36°F – 68°F.

All R.B. Annis Residual Field Indicators are calibrated before leaving the factory. Serialization and Certification are optional

Handling, cleaning and care: Prior to use, you should check the instrument for smooth moving of the pointer by slightly shaking it. Correct zero position of the pointer should be checked by rotating the instrument in horizontal position slowly by 360°: The maximum deflections (+) and (-) should be equal. The order of the earth magnetic field is ± 1 gauss. The pointer should show zero, if the "TEST" edge resp. arrow is aimed to west or east, since the instrument is less sensitive to magnetic field parallel to the pointer.

Do not expose the Residual Field Indicator to strong magnetic field in excess of 400 gauss, and do not drop the instrument. Whenever the instrument pointer fails to properly return to center zero, it is an indication that it has been exposed to high magnetic field or strong mechanical impact or vibration. This can crack the pivot jewels, creating unwanted friction and sluggish action.

Clean the housing with a soft cloth. Avoid seeping of dust or liquid into the housing of the Residual Field Indicator. Recommended interval for regular checks: 1 year.

DEMAGNETIZING SPECIALISTS SINCE 1928

CERTIFICATION
Of
Calibration

Annis Model 25
Magnetic Field Indicator

Serial Number _____ Gauss Range _____ Temperature _____ºF

It is hereby certified that the above serial numbered, Model 25 Magnetic Field Inspector has been individually tested and calibrated to meet manufacturers' new instrument specifications and tolerances as listed below. Such testing has been performed by one or two skilled technicians using procedural and accuracy standards, which have been approved by Military and multiple Industrial on-sight surveys.

Calibration is done in a uniform magnetic field as created by a precision Helmholtz Coil having the instrument platform carefully oriented to eliminate calibration error due to the earth's magnetic field.

Formula built Helmholtz Coil Standard No. 65-M-10 was originally tested by Nation Bureau of Standards and is used in conjunction with multiple laboratory type DC ammeters, two of which are crosschecked on a daily basis and all of which have calibration traceability to N.I.S.T. This "working" Helmholtz Coil is periodically checked against a duplicate reserve coil and against other certified Helmholtz Coil Standards we make for Quality Control and Calibration Laboratories such as: U.S. Navy, U.S. Air Force, United Testing Labs, General Electric, Pratt and Whitney, McDonnell Douglas, Etc.

These Model 25 Pocket Magnetometers are calibrated more accurately to international standards than any other moving-magnet type gaussmeter that is commercially available. Instruments having ranges of 2 to 100 gauss are calibrated to be accurate within 2% of full scale. Instruments having ranges outside of these values are calibrated to be within 5% of full scale.

All moving-magnet type gaussmeters measure magnetic field intensity at the movement staff location, which (on Model 25) is spaced 16 mm away from the test edge of the meter case.

Small area magnetic field sources display a strongly divergent field pattern. The3refore the "spaced" gauss readings, from such small sources, will be lower than surface readings. Large area sources, or uniform fields, display little or no field divergence, resulting in identical readings for either surface or closely spaced measurements.

North polarity of the source being checked is indicated b pointer deflection toward the right (+) side of the center zero dial. South polarity deflects left. Model 25 gaussmeters are quite stable and will maintain calibration accuracy even if accidentally exposed to field intensities as high as 400 gauss.

Instruments should not be dropped due to possible damage to the pivot jewels. Any suspect or damged instrument should not be returned for necessary repairs and re-certification.

This Model 25 Magnetometer was manufactured and calibrated by R.B. Annis Co., Inc. It is hereby certified to be within the tolerance of a new instrument.

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Test Date

_____

Signature of Calibrator

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