Power
Conversion
Power
Generation
Sensors

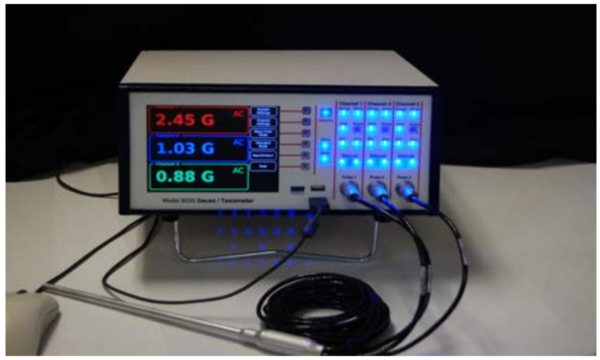
Hall effect gaussmeters

White Paper

Gauss/Tesla meter
Model 8000 Series

For more than 60 years, F.W. Bell has been recognized for leadership in Gauss Meters.

Today, F.W. Bell is building on that heritage with our new sixth generation of single, Model 8010 and three channel, Model 8030 Gauss Meters.



The 8000 series GAUSS TESLA METER from F.W. Bell leads the way for Advanced Hall Effect Magnetic measurement technology. The easy to use front panel programming feature incorporates the latest in user control operations. There are two models in the 8000 series family, a single channel version the model 8010 and a three channel version the model 8030.

The 8010 is capable of simultaneously measuring and displaying seven different parameters, including flux density, frequency, temperature, min, max, peak and valley. The 8030 is capable of simultaneously measuring and displaying seven different parameters per channel – flux density, frequency, temperature, min, max, peak and valley. With the 8030's vector summation feature, that makes a total of 27 different parameters.

This high accuracy instrument is fully equipped to meet most magnetic measuring application needs. Bell's exclusive dynamic probe correcting software increases the 8000 series measurement capabilities which makes it a very versatile magnetic measuring tool for numerous magnetic measurement applications worldwide.

Key features include high resolution, high accuracy and high speed with a large graphic color display. The 8030 features 50 kHz frequency response, temperature and frequency measurements, Auto Zero, Auto Range, Hold functions for Peak Valley, Min and Max, corrected and uncorrected outputs for each channel and Vector Summation and angle. The Model 8030 provides the user with gauss, tesla, Oe, A/m, IEEE-488, RS-232 and RJ-45 communications ports and Classifier output.

The 8030 operates with Bell's sixth generation Hall effect probes. These probes provide temperature compensation and measurement readings (0˚C to +75˚C) while monitoring the magnetic field. The easy to read color display is easily viewable in most light conditions and can be customized to meet use's specific needs. Applications range from basic magnetic measuring to sensitive complicated three axis vector summing requirements. All instruments are fully CE compliant.

Features

- Bright color Readout
- Large graphic color display
- Several probes available
- Automatic probe coefficient correction
- Displays in Gauss, Tesla, A//m or Oe
- Relative Mode
- Fully menu driven for easy operation
- Auto Zero and Auto Calibration
- IEEE-488 and RS-232 interface
- CE Compliant
- Manufactured to ISO 9000 standards
- Comprehensive Technical Support

Key features

- TFT Color LCD Display with Backlighting
- WVGA, 600 x 480 pixels
- Over 100 standard probes available
- Three channels
- Automatic probe coefficient correction
- Displays in Gauss, Tesla, amp/meter or Oe
- Relative mode
- Fully menu-driven for easy operation
- Auto zero and auto calibration
- IEEE-488, RS-232 and Ethernet RJ-45 interface
- CE-compliant
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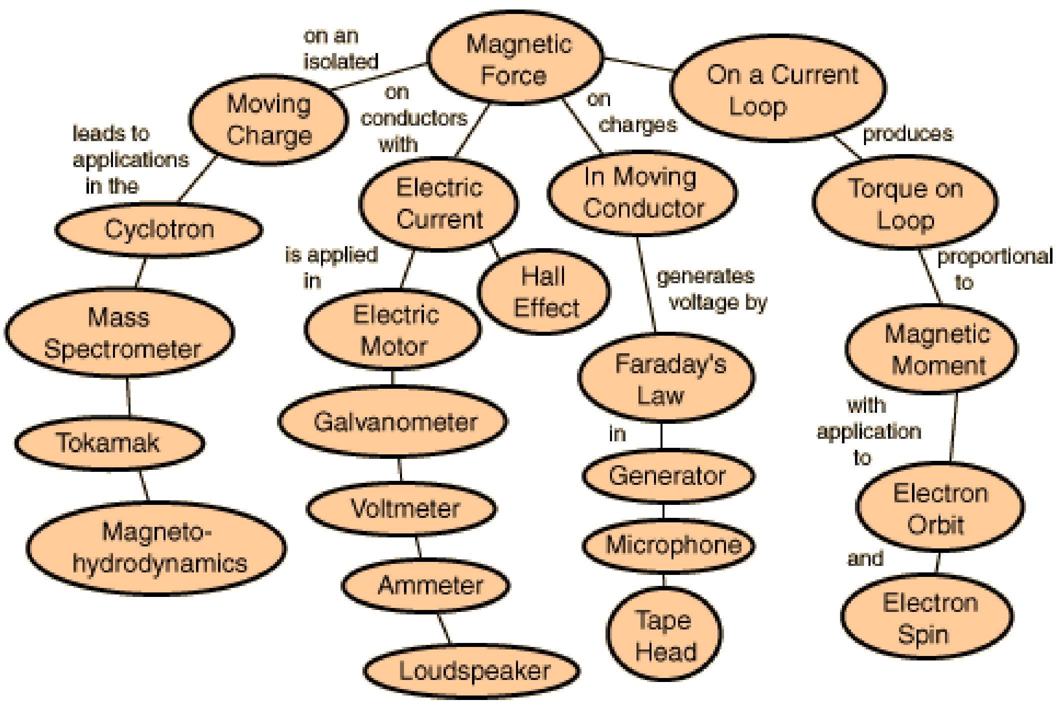
Gauss meters provide the only consistent and repeatable way to provide the critical information relating to magnetic fields. This information is vital for the user to make informed decisions relating to the strength and direction of the magnetic field or absence of one.

FW Bell customers utilize our instruments in highly diverse environments and applications. They are used in academic, laboratory, industrial, medical, pharmaceutical, aerospace, manufacturing, and electrical power transmission applications. Specifically, our instrument applications range from extremely accurate magnet calibration and positioning in applications such as particle accelerator equipment, to measuring the ELF radiation from common household electrical appliances. The list of Gauss meter applications is endless, and with the latest drive to utilize alternative energy this list is growing exponentially.

Applications



Contact

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Applications

- Residual magnetic fields on bearings and machinery, now subject to regulation
- Aircraft engine magnetic particle inspection
- Residual magnetic fields on welds
- Residual magnetic fields on parcels and packages
- Residual magnetic fields on ships' cargo
- Computer disk drive actuators
- Loudspeaker air gaps
- Electric motor air gaps
- Transformer stray field measurements
- Bending magnets
- Non destructive testing (magnetic)
- Goods inward and quality assurance inspection
- Magnet calibration
- Medical laboratory particulate testing
- Rapid mapping of magnetic field, such as from an MRI.
- Laboratory X, Y, Z magnetic field measurements.
- Transient field, even if a pulse occurs once for 5 milliseconds within a period of days.
- People with pacemakers.
- Office workers.
- Sewing machine operators.
- Hobbyists
- Homeowners
- Audio and other sensitive equipment.
- Paranormal activity measurement
- Assessment of magnetic materials.
- Analysis of magnetic circuits and components.
- Measurement of stray and leakage fields.
- Measurement of absolute and differential fields.
- Testing, sorting, classifying of magnets.
- DC and AC motor testing.
- Relay and solenoid testing.
- NDT Compliance testing.
- Loudspeaker testing.

Magnetic Flux

Magnetic flux is the product of the average magnetic field times the perpendicular area that it penetrates. It is a quantity of convenience in the statement of Faraday' Law and in the discussion of objects like transformers and solenoids. In the case of an electric generator where the magnetic field penetrates a rotating coil, the are used in defining the flux is the projection of the coil area onto the plane perpendicular to the magnetic field.

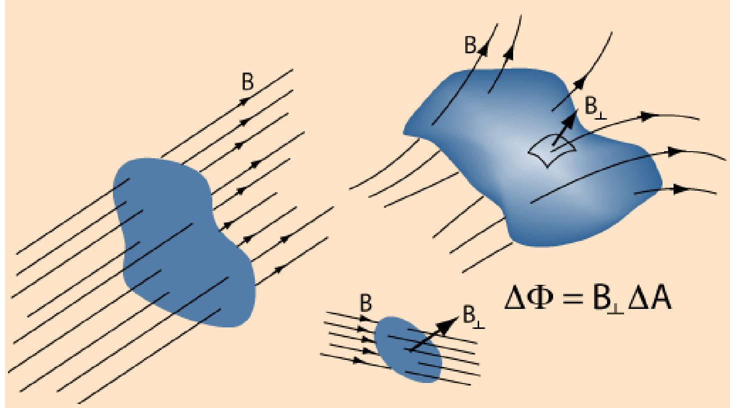
Magnetic field

$$\text{Magnetic flux} = \Phi = B\,A$$

Area perpendicular to magnetic field B

Magnetic flux illustration | Electric flux

Magnetic Flux Illustrations



The contribution to magnetic flux for a given area is equal to the area times the component of magnetic field perpendicular to the area. For a closed surface, the sum of magnetic flux is always equal to zero (Gauss' law for magnetism). No matter how small the volume, the magnetic sources are always dipole sources (like miniature bar magnets), so that there are as many magnetic field lines coming in (to the south pole) as out (from the north pole).

Magnet Basics & Gauss Ratings

Firstly, what is a magnet anyway? A magnet is basically any material that exerts a magnetic field. There are two basic types: permanent magnets and electromagnets. Electromagnets generate magnetic fields using electric currents. Permanent magnets, on the other hand, are materials that generate magnetic fields on their own and never lose their strength.

Most magnetic therapy products use permanent magnets.

Magnetic flux density is a measure of the strength of the magnetic field produced by a magnet. Gauss (symbol: G) is a convenient unit to use when talking about the kinds of magnets that the average person is used to. To give you an idea of what a gauss is, your typical refrigerator magnet exerts a magnetic field of about 10 gauss. Magnetic therapy products tend to use magnets that range from a few hundred gauss to over ten thousand gauss. The magnetic flux density (strength) of a magnet is largely a function of what the magnet is made of.

A great number of materials can be made into magnets. Typical permanent magnets include ceramic magnets, plastic magnets, hematite magnets, and neodymium magnets. The last of these, neodymium magnets (also known as rare earth magnets), exert extremely powerful magnetic fields – so strong, in fact, that a neodymium magnet the size of a penny can sometimes lift hundreds of pounds with the force of its magnetic field!

The size of a magnet also plays a significant role in determining the magnet's therapeutic strength. The same neodymium magnet that can lift hundreds of pounds with its magnetic field may in fact not even be able to penetrate more than a few inches into the human body due to its small size. It is the combination of the strength (magnetic flux density) and size of the magnet that determines the therapeutic strength of a particular magnet.

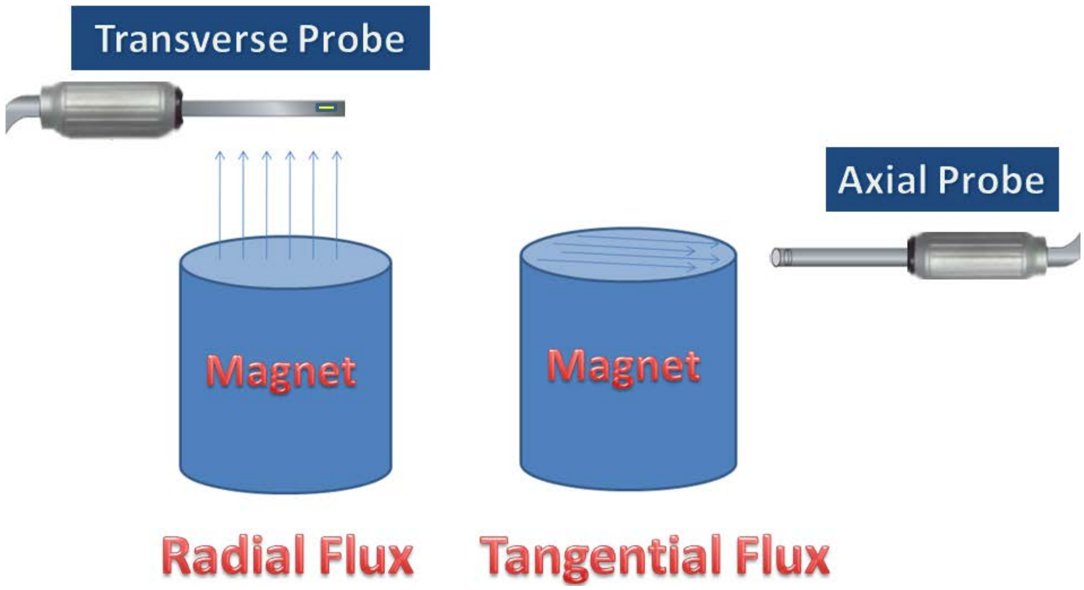
Finally, what is polarity? Perhaps one of the least understood aspects of magnetic therapy is the role that polarity plays in generating therapeutic effects. All magnets have north and south poles, with the magnet's north pole pointing to Earth's North Pole and the magnet's south pole pointing to Earth's South Pole. Polarity is the term used to describe the alignment of particles within the magnet. There are two types of magnets: bipolar magnets and unipolar magnets. Bipolar magnets are those that have both north and south polarity on the same side of the magnet, while unipolar magnets have the north pole on one side and the south pole on the other. One difference between bipolar and unipolar magnets is that unipolar magnets tend to have greater penetration than bipolar ones because the polarity is uniform on each side. Any other differences between the two types of magnets are still under investigation.

Gauss meter has been used for measuring the magnetism which is also known as the second unit of magnetic flux. It is a very common device which is being used in the electromagnetic field. There are different kinds of meters that has been used to measure different kinds of solid as well as liquid products it is also one of the forms of such meters. Let us discuss about how the gauss meter works i.e. with the help of some gadgets it has been used for the purpose of measuring the intensity of the magnetic field of any kind.

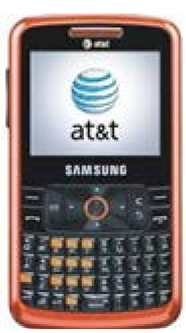
This is the era of electronic products and we can find such products at every corner of the word which are being operated with the help of electromagnetic fields that could be measured with the help of gauss meter. With the help of some example we will try to develop your understanding about the difficult topic of electromagnetic field. Let us start with some very common electronic products which has been used at our homes on daily basis i.e. microwave oven. We use the microwave oven in our routine life but never try to understand how it works and how our meal becomes hot in a short time.

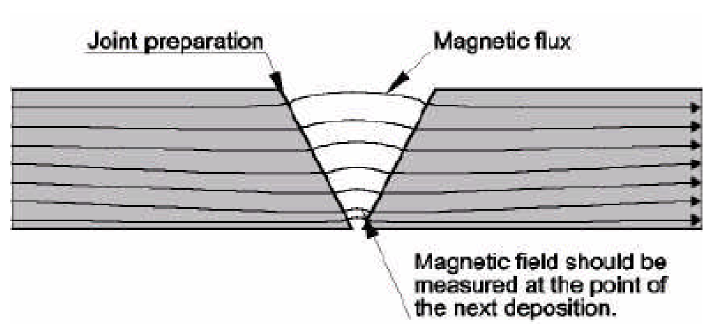
The answer is electromagnetic fields, there is a magnetron inside the microwave oven which is the part & parcel of the device and without it could not work that is why the electronic companies offered a warrantee of the magnetrons. If you want to measure the intensity of electromagnetic fields made by the microwave oven or your house you can use the gauss meter for the purpose and could know the intensity in cubic feet.

Depending on the type of magnetic flux you are trying to measure will determine what type of probes and fixture will be required.



Normally a person would use a transverse probe when measuring radial flux as shown above. This assumes that the peak flux level is far enough away from the magnet surface such that the hall chip in the gauss probe stem would be able to measure it. On the other hand if the flux is tangential to the surface a user might consider using an axial probe to measure the field. The transverse probe measure the flux perpendicular to the stem whereas the axial probe measures the magnetic field out in front of the probe tip.





Things which have magnets in them:

Speakers
Burglar alarm system sensors
Traffic light system car presence detectors

Door latches
Measuring instruments

In the medical field:

Magnetic fluid applications
Blood flow measurement
Eye surgery
Cell separation
Magnetic sealing of aneurysms
Magnetic tracers
Drug delivery
Bone growth

Adjuncts
Instrument & needle holders
Removal of foreign bodies Non-Invasive/Diagnostic
Applications
External activation of distraction devices
External switching of pacemakers
Magnetic Resonance Imaging

Electronic & Mechanical Devices
Hearing aids
Left heart assist devices
Implantable pumps

Invasive
Keyhole surgery guides
IUD's Assistors or Retention Devices
Prosthodontics
Orthodontics
Maxillofacial prosthesis
Joint prosthesis
Eyelid magnets
Colostomy closure
Retention of hearing aids

Interference with Cell Processes
Bone union or fracture healing
Tumour therapy