

EMF Meters - A Practical Guide to using an EMF Meter - Ver. 3.0

As the field of Ghost Hunting rapidly grows there are many amateur investigators picking up EMF meters and trying to find ghosts. The problem with this growth of EMF meter use is that many people are incorrectly using or misinterpreting the meters displayed values. This is widely in TV reality shows, ghost hunting clubs and tours, and etc. You may ask, "What makes you qualified to write a tutorial on proper use of an EMF meter?". I am now 53 years old and graduated in 1986 with an Electronics Engineering Degree. I have been in the field of electronics and technology ever since my graduation and have obtained several certificates in various aspects of electronics theory and design. I am a certified RF/EMF specialist with a broad spectrum understanding of the RF (Radio Frequency) and EM (Electromagnetic) field of sciences.

I first became interested in the paranormal around 1982, following my education, I began applying the RF/EM field of science and theory to the paranormal. I have learned a considerable amount over the years and will apply this knowledge and education to this tutorial.

What is EMF?

EMF - [Electromagnetic Field] also known as [Electromagnetic Frequencies]

-Définition

The electromagnetic field is a physical field produced by electrically charged objects. It affects the behavior of charged objects in the vicinity of the field. The electromagnetic field extends indefinitely throughout space and describes the electromagnetic interaction. It is one of the four fundamental forces of nature (the others are gravitation, the weak interaction, and the strong interaction). The field propagates by electromagnetic radiation; in order of increasing energy (decreasing wavelength) electromagnetic radiation comprises: radio waves, microwaves, infrared, visible light, ultraviolet, X-rays, and gamma rays. The field can be viewed as the combination of an electric field and a magnetic field. The electric field is produced by stationary charges, and the magnetic field by moving charges (currents); these two are often described as the sources of the field. The way in which charges and currents interact with the electromagnetic field is described by Maxwell's equations and the Lorentz force law. From a classical perspective, the electromagnetic field can be regarded as a smooth, continuous field, propagated in a wavelike manner; whereas, from a quantum mechanical perspective, the field is seen as quantized, being composed of individual photons.

Man-made EM fields are everywhere, they are created by the plethora of electronic devices available on the market, automobiles, appliances, general electronics, manufacturing, electrical distribution and more. There are also natural sources of EMF that exist such as the earth's magnetic field, rock formations, deep space radiation, bio-electric fields from human and animal species and yes sometimes ghosts and other paranormal activity. But the reader must be aware that a very large majority of EMF related meter activity or readings are associated with man-made interference and natural sources.

Just a side note, if the reader is interested in more detailed information on EMF and its related effects on the human body please click on the "[Non Paranormal](#)" link. Here you can find more detailed information on this topic.

The EMF Meter



Figure 1

Your basic EMF meter comes in two different configurations. Single Axis or Triple Axis also known as Trifield or 3-Axis. The single axis EMF meter is a very directional meter when it comes to measuring EM fields. This means you have to be pointed at the EM field with the sensor to get a valid reading. If you are off axis or pointed away from the EM field, your readings will be very low or inaccurate and many times non-existent.

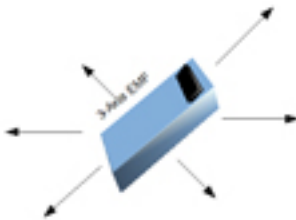


Figure 2

The Trifield or 3-axis EMF meter allows you to measure the EM field in 3 dimensions. This means it will detect EM fields from all angles so there is no need to orientate the device towards the EM field you are trying to measure. EMF meters of this type are better equipped to read broad types of EM fields and also assist in determining overall levels of EMF exposure in the selected area.

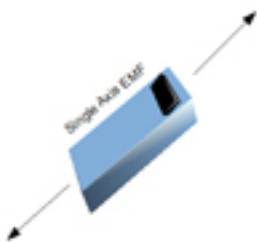


Figure 3

The single axis EMF meter is popular with many ghost hunters, it is also used in the RF and electronics industry to measure EM fields for potentially high levels of exposure. Keep in mind the single axis meter is a very directional EMF detector meaning that you have to point the unit directly at the EM source to get an accurate reading. If the meter is not in direct alignment with the source the EM level will be considerably lower or nonexistent.

Most all EMF meters are calibrated for use in the 50Hz or 60Hz bands. Please note that most of these EMF meters in the electric and magnetic field settings are frequency weighted from 30Hz to about 500Hz. This means that a 2mG (milligauss) magnetic field at 60Hz will display a value of about "2" on the meter, while a 2mG (milligauss) at 120

Hz will read a "4". These EMF meters typically give a flat response of +/- 20% over 1000Hz and as the EM Field frequency increases the sensitivity decreases. Also keep in mind that most all EMF meters on the market are AC type EM detectors. (AC) stands for "Alternating Current" and means that the EMF meter is sensitive changing magnetic fields above 0 Hertz. Static or DC (Direct Current) EM fields require a special type of EMF meter which we will discuss later in this article.

Inside an EMF meter are some basic components such as an inductor coil, amplifier and meter or display circuits for reading values measured.

The inductor coil (Figure 4) when passed through a small changing electromagnetic field of a couple of microvolts or millivolts will create a small current in the inductor core windings that is then amplified several hundred or thousand times to a few volts. This voltage is then processed and sent to the display of the unit for reading. The measurement is read in Gauss or Tesla units and the scale can be adjusted according to the amount of EMF present. Note: These units of measure are usually in the micro or "milli" range. This is .001 or .0001, a reading of 3 mGauss would be .003 Gauss, likewise a reading of 3 μ Tesla would be .000003.

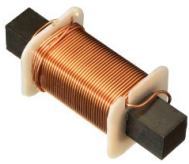


Figure 4

Here are some examples Gauss and Tesla values below:

- 10^{-9} – 10^{-8} gauss – the magnetic field of the human brain
 - 10^{-6} – 10^{-3} gauss – the magnetic field of Galactic molecular clouds
 - 0.25–0.60 gauss – the Earth's magnetic field at its surface
 - 25 gauss – the Earth's magnetic field in its core
 - 50 gauss – a typical refrigerator magnet
 - 100 gauss – a small iron magnet
 - 2000 gauss – a small neodymium-iron-boron (NIB) magnet
 - 10000 to 13000 gauss – a large high performance speaker voice coil gap
 - 600–70,000 gauss – a medical magnetic resonance imaging machine
 - 10^{12} – 10^{13} gauss – the surface of a neutron star
 - 4×10^{13} gauss – the quantum electrodynamic threshold
 - 10^{15} gauss – the magnetic field of some newly created magnetars
 - 10^{17} gauss – the upper limit to neutron star magnetism
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- 31.869 μ T (3.2×10^{-5} T) – strength of Earth's magnetic field at 0° latitude, 0° longitude
 - 5 mT – the strength of a typical refrigerator magnet
 - 0.3 T – the strength of solar sunspots
 - 1.25 T – magnetic flux density at the surface of a neodymium magnet
 - 1 T to 2.4 T – coil gap of a typical loudspeaker magnet
 - 1.5 T to 3 T – strength of medical magnetic resonance imaging systems in practice, experimentally up to 17 T
 - 4 T – strength of the superconducting magnet built around the CMS detector at CERN
 - 8 T – the strength of LHC magnets.
 - 11.75 T – the strength of INUMAC magnets, largest MRI scanner.
 - 13 T – strength of the superconducting ITER magnet system
 - 27 T – maximum field strengths of superconducting electromagnets at cryogenic temperatures
 - 35.4 T – the current (2009) world record for a superconducting electromagnet in a background magnetic field
 - 45 T – the current (2015) world record for continuous field magnets
 - 10^8 - 10^{11} T (100 MT-100 GT) – magnetic strength of the average [magnetar](#)

How to use the proper units during measurement?

It is important to understand the values and types of measurements you are taking. I see many individuals working with EMF meters calling out numbers such as '2', or "I have a 4". These numbers mean nothing without understanding what scale and unit of measure you are reading at the time. For example, a "2" could be 2 mGauss, or 2 μ Gauss. You could be measuring in Tesla units and these values could be μ Tesla's.

Most field measurements will be done with the mGauss units. During scientific studies, the μ Tesla unit of measurement will be used. You can convert from μ Tesla to mGauss easily using the following; 1 μ Tesla = 10 mGauss, a ratio of 1:10.

When you are documenting your findings, using the proper unit of measure, this will allow your data to be much more accurate and will be more valuable to the scientific community or for future reference.

Types of EMF Meters

There are several type of EMF meters in this category and they are as follows:

- Single & 3-Axis EMF Meter (Frequency Weighted)
- Single & 3-Axis EMF Meter (Flat Frequency, Non Weighted)
- Single & 3-Axis EMF Meter (Extended Range Broadband)

Frequency weighted EMF meters which are like the majority of the EMF meters sold on the market are designed to measure levels of EMF that are absorbed by the human body. This type of EMF meter will not give a true field reading at most frequencies. Even though these EMF meters can measure a large range of EM frequencies such as 30Hz to around 100KHz, accuracy falls off at the higher frequencies.

The human body will absorb these EM fields and depending on the exposure level and frequency will absorb more or less EM field radiation. The body converts these into tiny electrical currents and impulses that can cause biological symptoms and strange phenomena to occur. Starting with a 60Hz field, effects may be subtle but as the frequency doubles and triples the effects can be increased exponential.

Non-Weighted frequency EMF meters are better suited for actual true EM field measurements across the rated frequency range. These type of meters are better used in the laboratory but can be used in combination with the frequency weighted EMF meter for validation purposes. So, all this talk about frequency weighted & non-frequency weighted. Which are better? They both have their benefits in the measurement of EM fields. FW (Frequency Weighted) meters can give you readings which are proportionate to the human exposure level from EM fields while the NFW (Non-Frequency Weighted) can give you more linear accuracy over the entire frequency range allowing you to obtain actual EM field levels.

The FW meters may be better used in paranormal investigations because they represent the exposure level relative to the human body.

The Extended Range Broadband EMF Meter has an RF sensor that is frequency flat over an extended range from about 100KHz to about 2.5GHz. Higher priced models will extend this range even further. These meters are basically the same as their counterparts but have an increased range of operation and accuracy. They are generally more expensive and the cost may not be justified in many cases.

The Natural EMF meter differs from the AC EMF meter. The Natural EMF meter measures static DC or natural EM fields. These fields have no alternating current and are considered to be 0Hz or static. These type of meters are usually designed to ignore AC fields and can be very useful in paranormal investigations. The natural EMF meter will be sensitive to fields emitted from space, earth, humans, animals and so on. These very weak DC magnetic fields can be measured and recorded during an investigation to help understand the phenomena that may be occurring. The average meter can measure DC magnetic fields from 0 to about 100 μ Tesla.

Before we go any further I need to clarify one important fact. EMF meters are ***not*** ghost detectors! I frequently see people marketing these meters as ghost detectors which they are certainly not. EMF meters were designed for electricians, power companies, electronics industry and personal exposure studies. Both AC and DC EMF meters will detect a variety of EM fields and validation on this alone is not good practice. All data collected should be used with meticulousness as to not falsely claim the elevated EMF readings as paranormal activity without having multiple other sources of evidence to collaborate these readings.

Most EMF meters will cover a decent range of frequencies in the EM band especially the lower frequencies in the ELF to LF bands. It is theory that an entity or spirit can emit an EM field when it is present or trying to communicate or manifest itself. There are very few studies that can produce solid evidence as to what types of frequencies or EM fields levels may be present during these manifestations of an entity. Current research suggests a possible link to EMF meters and spirit or entity manifestations, not evidence of. It is possible that when a spirit or entity tries to manifest or communicate it collects energy from the surrounding area producing an EM field in the process. These EM fields are relatively low compared to other man-made sources, probably in the 10 μ Gauss to maybe 10 mGauss range.

This energy fluctuation creates an electromagnetic field. In theory, this EM field can be measured using devices such as an EMF meter. But we must be careful to not jump to conclusions and call every reading on the EMF meter a ghost or spirit. We are surrounded by EM fields every day and many times the reading we get from an EMF meter is most likely man-made. During an investigation your EMF meter should be used

to determine any and all man made causes of EM fields first! You should also then try and rule out any natural EM fields as well, except for maybe your ghost!

EM fields and their effect on the human body

It is a known fact that EMF levels of 3mG or higher can cause biological and hallucinogenic effects on a human subject that is hypersensitive to EM fields. These people can experience headaches, nausea, skin irritations, ringing in the ears, hallucinations, paranoia and more.

Use your EMF meter to help detect hot spots in the house or building where people may spend a considerable amount of time. You should also look for faulty wires, fuse or breaker boxes, electrical outlets, appliances and so on. AC power adapters also called "Wall Warts", are big producers of EM Noise. Any of these can cause high levels of EMF and create potential problems with human exposure. We had an investigation where a middle aged woman was experiencing night time apparitions and shadows near her bed. She claimed they only appeared at night and were of different shapes and sizes. They were described as dark or black masses and shadows.

During an initial sweep of her bedroom we found a startling high level of EMF around the alarm clock on the night stand near the bed where she slept. The levels were approaching 300mG, that is ten times what the maximum human exposure limit should be. The measurement extended out for about a 18-24 inch radius and then dropped off dramatically after that. No other potential source for the shadows were found and upon replacement of the alarm clock by the client, the EMF levels were decreased and the shadows were not seen again. The client also claimed that wild vivid dreams would occur during this period of time also. The dreams were eliminated once the clock was replaced. For more detailed information on EM fields and their biological effects please see our "[Non-Paranormal](#)" section.

When using an EMF meter such as a Single Axis, Trifield or K-II for assisting in validation of a spiritual manifestations, you must remember not to rely solely on the device for evidence of a haunting. The EMF meter can be a great tool to assist the investigator once all other man-made and natural causes are ruled out. During an investigation where an EMF meter is being used for gathering evidence of a haunting, the following tips may be helpful.

Use more than 1 EMF meter when possible. Make sure each of the meters are the same model. Place them in a row or a circle while monitoring their exposure to the EM fields. Many times a spirit or entity that may interact with the device will light up only 1 at a time. This can help confirm that it was not a contamination from a larger external EM field source.

If using a single axis EMF meter, remember to angle the meter towards the source you suspect may be emitting an EM field. Usually the meter will have the sensor position or location printed on it.

Check your settings before you take measurements, usually mGauss is a good starting point and move the scale up or down according to your EM field.

Make note of your scale, you could be measuring mGauss but if your scale is .001, .01, .1, 1, 10 or 100, this can make a difference in your values recorded and can be misinterpreted. These values are factors of ten and a good starting point would be .01 or .1 scale. raise the scale from there if needed. When using a Trifield EMF meter, there is no need to angle the meter towards the source but using a single axis meter along with a 3-axis meter can help increase the quality of data collected.

Check your battery often, a low battery can skew your results.

Some meters have Magnetic, Electric and RF settings. These should be self-explanatory but use your Magnetic settings for most applications in the paranormal. The Electric settings can be used to help determine standard house AC electrical problems. The EM field is still read in each mode but it changes the way the meter interprets the information received. Electric fields and Magnetic fields are understood by the meter slightly different, although some meters allow the "Sum" of the two fields to be read concurrently. This mode can also be helpful in certain situations.

When doing an EVP (Electronic Voice Phenomena) session, place the meters near but not too close to the audio recorders. Make sure you log any changes in meter response that may correspond to a question asked. This way you can later sync this to any audio and video recordings that were made in the room at that time. Also keep in mind that meter responses can be coincidental with questioning on occasion. The questions should be repeated with various time intervals to help validate the study or rule out any contamination.

I hope this article has been helpful, please feel free to contact me if you have any questions regarding the article or about EM fields and EMF meters.

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