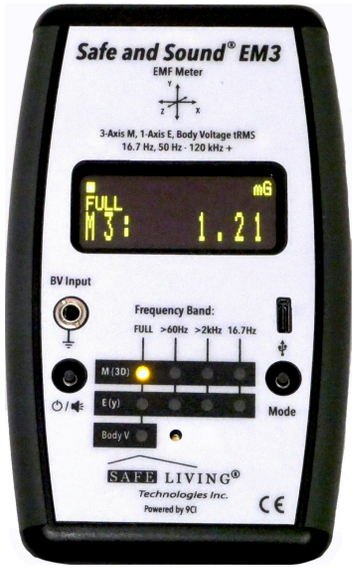
Safe and Sound EM3

3D MAG, E and Body Voltage EMF Meter

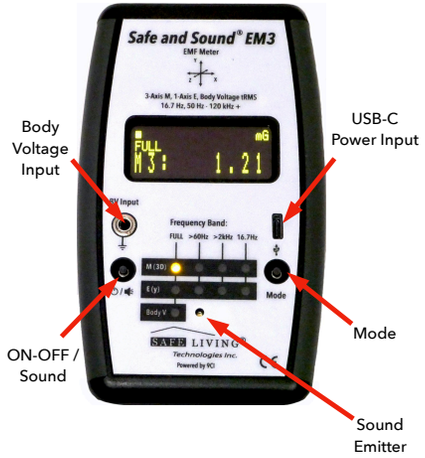


Operation Guide

WELCOME

Safe Living Technologies is pleased to introduce the Safe and Sound EM3 EMF Meter. Designed to meet our professional standards of accuracy and reliability, the Safe and Sound EM3 features:

- MAG <±1dB response from 16.7 Hz to 120 kHz
- E <±1dB response from 16.7 Hz to >300 kHz
- 50/60 Hz ± 2% for E and M – meter-meter variation
- Measures 3D Magnetic, 1D Electric, Body Voltage
- Sensitivity: 0.01-173mG, 0.01-200V/m, 1-12,000mV
- Filters: 16.7Hz, >60Hz, >2kHz, FULL (no filters)
- RMS & PEAK measurement modes
- Sound output
- Compact size matching our other Safe and Sound series of meters
- Cables for Grounded E and Body Voltage readings
- Intuitive & easy operation with clear mode indicators
- Extremely sensitive for Building Biology applications
- Long battery life from 2 AA alkaline cells: >17 hours
- Continuous operation via USB-C power



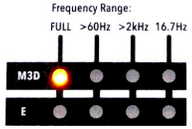
OPERATION

To turn ON the unit, simply push and hold the Power button. The startup screen will show the self calibration process and the approximate battery level in percent remaining:

The EM3 will then go in its last measuring mode. Simply press the MODE button to cycle through the measurement types and filter options shown below:

M3 FULL	M3 >60Hz	M3 >2kHz	M3 16.7Hz
E FULL	E >60Hz	E >2kHz	E 16.7Hz

The yellow LEDs below the display will also indicate your selection to clearly show your current mode:



If you wish to display the individual XYZ sensor values when measuring magnetic fields, press and hold the MODE button until the display changes.

Press and hold once again to revert to 3D display, or a single press to move to the next MODE & filter.

FILTER FREQUENCIES

The filter frequencies were chosen very carefully by Safe Living Technologies to help isolate and identify dirty electricity >60 Hz, or >2 kHz. A dedicated 16.7 Hz filter is also available.

RMS (standard) or PEAK Mode

The standard for measuring low frequency AC magnetic or electric fields is RMS. To change the mode from RMS to PEAK or vice versa, press and hold both the Power and Mode buttons until the display shows the new mode.

UNITS: mG - nT

To change the display units from mG to nT or vice versa, power OFF the unit by holding the Power button. Then, press and hold both the Power and Mode buttons until the unit turns on and shows the new display unit. Then, power OFF the unit.

SOUND

To enable/disable sound, turn the meter on, then press the power button once. A speaker symbol will appear on the display when the sound is enabled. You will start to hear "clicks" as the measurement level increases. At high levels, the clicks will become fast enough to create a tone.

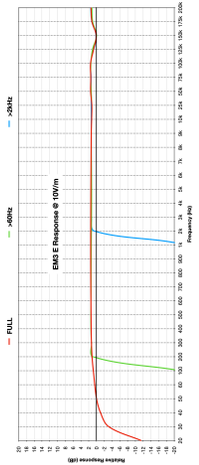
BODY VOLTAGE

The EM3 will automatically change to Body Voltage measurement mode when the body voltage cable is inserted to the BV Input Jack. A blue LED will indicate that the EM3 is in Body Voltage mode. The displayed values are in mV RMS up to maximum of 12,000 mV.

Technical Specifications

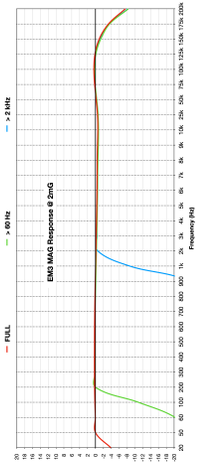
E Freq. Response: -0/+2 dB, 16.7 Hz - >200 kHz
MAG Freq. Response: ±1dB, 16.7 Hz - 120 kHz
Body V Freq. Response: <±1dB 50Hz - 120 kHz
Battery Life: > 17 hours

E-Field Response Plot



E Response plot formula used:
$dB = 20 \times LOG_{10}$ (10V/m ÷ Display V/m)

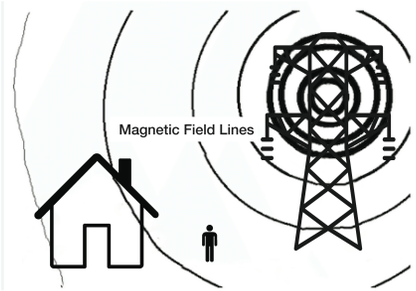
MAG Field Response Plot



MAG Response plot formula used:
$dB = 10 \times LOG_{10}$ (2mG ÷ Display mG)

MEASURING MAGNETIC FIELDS

AC magnetic fields are produced by alternating electrical current flow. The field strength is highest when closer to the source, and it decreases as you move further away from the source. You can picture these fields as concentric rings emitting from the source. In the case of common plug-in products, the AC magnetic field may only extend 2 – 3 feet. However, for more powerful sources (e.g., high voltage power lines), these fields can sometimes travel up to several hundred feet.

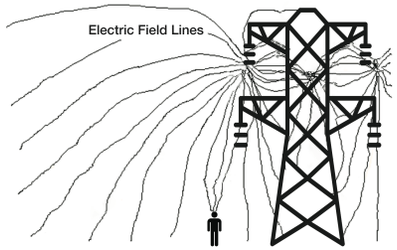


AC Magnetic Fields: concentric rings radiating from a source, which decrease with distance.
Measurement units are expressed in milliGauss (mG) or in nanoTesla (nT).
The Safe and Sound EM3 EMF meter has three AC magnetic field sensors, with each sensor oriented to register fields from the relative X, Y and Z axes (see the diagram illustrated on the meter's front cover).

The meter will calculate the 3-axis equivalent measurement (M3D) using the following equation:
M3D RMS = $\sqrt{(X^2 + Y^2 + Z^2)}$
M3D Peak to Peak = RMS x 2.8 (sinusoidal sources)

MEASURING ELECTRIC FIELDS

AC electric fields are produced when an electrical voltage is present on wiring (i.e., connected to a voltage source). Unlike AC magnetic fields, there is no electrical current required to produce electric fields, meaning an appliance or device does not necessarily need to be powered on. Common sources of AC electric fields include: home electrical wiring and outlets, overhead power lines, power cords and extension cords. AC Electric Fields generally travel 6 – 8 feet from the source, but they can travel further in some cases (e.g., high voltage power lines). AC Electric Fields have a natural attraction to ground, to other electrically conductive materials, and to the human body.



AC Electric Fields: jagged field lines lines from a radiant source, which travel to places of lower electrical potential or to ground.
Measurement units are expressed in Volts per metre V/m.
The Safe and Sound EM3 measures Electric Fields in a single axis (Y axis). The meter will need to be oriented on all three individual axes (i.e., X, Y, Z) to obtain the 3-axis equivalent measurement. This equation may be used to estimate the 3-axis measurement:
E3D RMS = $\sqrt{(X^2 + Y^2 + Z^2)}$
E3D Peak to Peak = RMS x 2.8 (sinusoidal sources)

MEASURING BODY VOLTAGE

The Body Voltage measurement is an indication of AC electric field exposure on the human body; it is not a direct measurement of electric fields in the environment. Yet it does demonstrate how the body is affected when exposed to electric fields. This method of measurement was created by the Building Biology Institute, as an alternative to standard AC electric field testing.

This procedure consists of taking the voltage reading between a person (typically, holding a metallic hand probe that is connected to the meter) and a dedicated ground point (also connected to the meter). A rod driven into the earth is preferred as a ground point, although some may use a ground connection inside the home (e.g., ground connection on electrical outlet). These measurements are best focused on sleeping areas. The general procedure involves: determining the AC electric field exposure, reducing/eliminating the electric field sources, and re-measuring.

RMS AND PEAK DEFINITIONS

Peak measurements represent the highest value of an alternating waveform.
RMS measurements represent the DC equivalent value of an alternating waveform. This is generally about 70.71 % of the Peak value, in reference to a standard sinusoidal wave. RMS measurements are referred to in most EMR guidelines including organizations such as the Building Biology Institute.
PEAK mode is a full peak to peak measurement. We feel that PEAK mode will provide more information regarding dirty electricity and its biological effects.

The meter will calculate the 3-axis equivalent measurement (M3D) using the following equations:

M3D RMS = $\sqrt{(X^2 + Y^2 + Z^2)}$
M3D Peak to Peak = RMS x 2.8 (sinusoidal sources)
E3D RMS = $\sqrt{(X^2 + Y^2 + Z^2)}$
E3D Peak to Peak = RMS x 2.8 (sinusoidal sources)

GROUNDING

What is a Proper Ground?

A proper ground is a ground physically (and electrically) connected to earth via a conductive material such as copper, aluminum, or an aluminum alloy. A true earth ground, as defined by the National Electrical Code (NEC), consists of a conductive pipe, or rod, physically driven into the earth to a minimum depth of 8 feet.

In electrical theory, "ground" is often considered the point of lowest electrical potential in a circuit, and is used as the return path back to the voltage source. Ideally, this ground value would be considered 0 V (i.e., no electrical potential), and it would be used as the lower reference point for voltage measurements (i.e., measuring differences in electrical potential between two points). The main idea is that the ground point with the lowest electrical potential will yield the most reliable measurements.

In practice, ground connections in the home such as water pipes and outlet ground pins tend to have some electrical potential present, where they are not a true 0V reference. Even the soil/earth directly outside your home may not be a true 0V reference. They do, however, still act as a point of low electrical potential to use as a reference point for voltage measurements.

For voltage measurement purposes, a ground connection with lower electrical potential will yield a higher reading than a ground connection with slightly higher electrical potential. The potential difference between the two points is greater in the former, and is less in the latter.

GROUNDING

This can vary by area/region; but for most reliable measurements, an earth ground connection is usually preferred over an outlet ground or water pipe ground connection. The main idea is that the ground point with the lowest electrical potential will yield the most reliable measurements.

NOTES

The unit will turn itself off after 30 minutes to conserve battery life.

To use the Safe and Sound EM3 to measure Magnetic Fields continuously - or without batteries, connect a computer or 5V USB charger to the USB-C jack.

Electric Fields or Body Voltage cannot be accurately measured while using an external power source.

Use AA Alkaline Batteries Only.

Environments with high AC Magnetic and Electric fields are now often a reality. The goal is to reduce your exposure as much as possible. This is especially important in sleeping areas.

For more information, please visit our website: **www.safelivingtechnologies.com** for further information.

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