

# Safe and Sound EM2

3D MAG & E EMF Meter

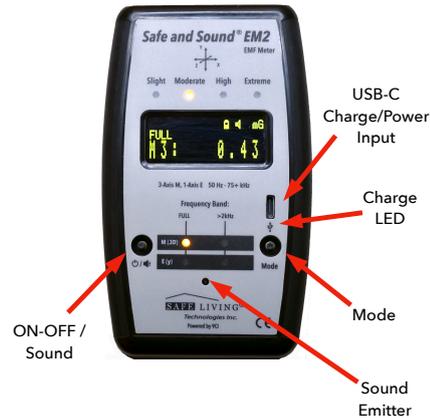


Operation Guide

## WELCOME

Safe Living Technologies is pleased to introduce the Safe and Sound EM2 EMF Meter. Designed to meet our professional standards of accuracy and reliability, the Safe and Sound EM2 features:

- MAG  $\leq \pm 1$ dB response from 50 Hz to 120 kHz
- E  $\leq \pm 1$ dB response from 50 Hz to 75 kHz
- 50/60 Hz  $\pm 2\%$  for E and M – meter-meter variation
- Measures 3D Magnetic, 1D Electric
- Sensitivity: 0.1-200mG, 0.1-400V/m
- Filters: >2kHz, FULL (no filters)
- RMS & PEAK measurement modes
- Sound output
- Compact size matching our other Safe and Sound series of meters
- Intuitive & easy operation with clear mode indicators
- Long battery life from built-in rechargeable cells: up to 24 hours
- Continuous operation via USB-C power



## OPERATION

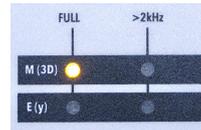
To turn ON the unit, simply push and hold the Power button. The startup screen will show the self calibration process and the approximate battery level:



The EM2 will start up in its last measuring mode. Simply press the MODE button to cycle through the measurement types and filter options shown below:

M3 FULL    M3 >2kHz  
E FULL    E >2kHz

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 >2 kHz.

### 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.

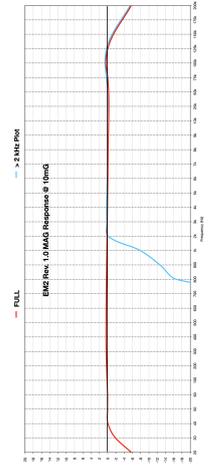
## SOUND

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.

## Technical Specifications

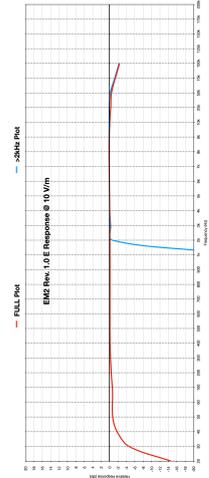
E Freq. Response:  $\pm 1$ dB, 50 Hz - 75 kHz  
MAG Freq. Response:  $\pm 1$ dB, 50 Hz - 120 kHz  
Battery Life: up to 24 hours

MAG Field Response Plot



MAG Response plot formula used:  
dB = 10 x LOG<sub>10</sub> (2mG + Display mG)

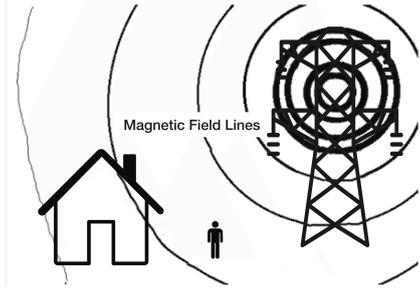
E-Field Response Plot



E Response plot formula used:  
dB = 20 x LOG<sub>10</sub> (10V/m + Display V/m)

## 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.



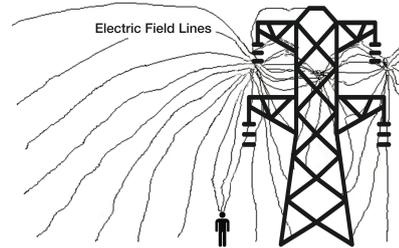
AC Magnetic Fields: concentric rings radiating from a source, which decrease with distance. Measurement units are expressed in milliGauss (mG) or in nanoTesla (nT). The Safe and Sound EM2 EMF meter has three AC magnetic field sensors, with each sensor oriented to register fields from the relative X, 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:

$$M3D = \sqrt{X^2 + Y^2 + Z^2}$$

## 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 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 EM2 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:

$$E3D = \sqrt{X^2 + Y^2 + Z^2}$$

## 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:

$$M3D = \sqrt{X^2 + Y^2 + Z^2}$$

$$M3D \text{ Peak to Peak} = \text{RMS} \times 2.8 \text{ (sinusoidal sources)}$$

## CHARGING THE BATTERY

The EM2 features internal rechargeable NiMH batteries. When the unit is turned ON, the available battery capacity is displayed.

During operation, the battery status icon will show a Full, Medium or Low charge. To charge the battery, plug in a USB power cable to the Power Input connector. A blue LED above the USB-C connector and the battery symbol in the display will indicate that the EM2 is charging. A full charge from a depleted battery can take up to 12 hours.

## BUILDING BIOLOGY LEDs - FULL Range

Like our other Safe & Sound RF meters, the EM2 has four LEDs above the display to quickly show the intensity of the field being measured.

● GREEN (solid) Safe:

0.1 - 0.2 mG | 0.1 - 0.3 V/m

Good for sleeping areas and long term exposure.

Flashing indicates best and ideal conditions that are < 0.1 mG | < 0.1 V/m

● YELLOW Moderate:

0.2 - 1.0 mG | 0.3 - 1.5 V/m

Reduce this level for term exposure.

● ORANGE High:

1.0 - 5.0 mG | 1.5 - 10 V/m

Try to limit the time of your exposure at this level.

● RED Extreme:

5-25 mG | 10-50 V/m

Move away from these exposures.

Flashing indicates: 25-50 mG | 50-100 V/m

Fast Flashing indicates: 50-100 mG | 100 - 200 V/m

Fastest Flashing indicates: > 100 mG | > 200 V/m

**Note that the Building Biology LEDs are disabled when using the > 2 kHz filter.**

## NOTES

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

To use the Safe and Sound EM2 to measure Magnetic Fields continuously - or without batteries, connect a computer or 5V USB charger to the USB-C jack.

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

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](http://www.safelivingtechnologies.com) for further information.

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