GIGAHERTZ SOLUTIONS®

Dual Function - Gauss/Tesla meter for AC electric and AC magnetic fields

ME 3030B / ME 3830B / ME 3840B

(16 Hertz to 2 Kilohertz) / (5 Hertz to 100 Kilohertz) / (5 Hertz to 100 Kilohertz)

Manual

Please read this manual carefully before you start using this instrument. The manual contains important information for the safety, usage and maintenance of this meter.

Note:
Order codes for the above instruments in English versions are eME 30303B, eME3830B and eME3840B

Safety instructions

Instruments of the ME 3 series from GIGAHERTZ SOLUTIONS® set new standards in low frequency ac field measuring technology. Gigahertz Solutions has created professional technology at an outstanding price/performance ratio, possible only through innovative and patented control elements, as well state of the art manufacturing processes.

This meter allows you a qualified evaluation of the exposure caused by AC electric and AC magnetic fields, according to the internationally recognized, compulsory measuring methods for workstations (TCO/MPR). It also complies with the recommendations of building, and electrobiology in the frequency range 16 Hz up to at least 2 kHz, better up to 100 kHz.

This meter is compliant with CE - guidelines.

We thank you for the confidence you have shown in buying a Gigahertz Solutions product, and we are convinced it will meet your expectations.

Contents

Safety Instructions:

It is imperative to carefully study the instruction manual prior to using the field meter. A great deal of important information regarding safety and maintenance is included.

The grounding of the field meter required for the electric field measurements should be performed with the supplied grounding lead which can be connected to unpainted water, gas or heating pipes. If there are none of the above-mentioned grounding options available, a licensed electrician could temporarily make use of the grounding conductor in a grounded outlet. In this case, however, an electric shock hazard may occur when the grounding clip touches the current-carrying phase conductor.

To prevent shock hazards or the destruction of the field meter, neither the instrument itself nor the adapter should ever come into contact with water. The penetration of water into the case may lead to the destruction of the electronics inside. Field meters are not to be stored outdoors or exposed to rain. Clean only the outside of the case, using a damp moist cloth. Do not use cleaners or sprays.

Prior to cleaning the field meter or opening the case, shut it off and unplug all extension cords. There are no user-serviceable parts inside the instrument.

Due to the high sensitivity level, the electronics of the field meter are very sensitive to heat and impact, and touch. Therefore, the instrument should not be left in the sun, on a heating element

or facsimile. The meter should not be dropped and the electronics inside should never be manipulated.

This field meter should only be used for the purposes described and only in combination with supplied or recommended accessories.

Measurement Instructions

Getting started

Attach the new battery to the battery clip and place it back into the battery compartment. While putting the battery back into the compartment, ensure that none of the battery leads get trapped between the battery and some protruding part of the circuit board. If this should happen the cover will not slide back into place properly.

Preparations Prior to Testing

1. Check the field meter according to the instructions laid out under "Getting Started".

2. By means of turning off the main circuit breaker in the main panel, it is possible to determine which of the fields are caused from inside the house and which ones are from the outside, such as high-tension power lines, railway trails, pole-mounted or surface transformers as well as neighboring houses and apartments. If external fields are suspected, their sources can be traced by moving the field meter in the direction of the highest readings.

3. When performing an EMR survey in homes or at workplaces, all electric appliances and electronic devices should be turned on, including those that come on only temporarily such as refrigerators or storage space heaters (eg. in adjoining rooms). By turning the various appliances off and on, it is possible to locate the most important field sources.

4. A sketch of the measured area, that shows the corresponding testing results, will allow a future analysis of the situation. Thus, appropriate remediation strategies can be determined.

5. Ideally, all measurements are to be repeated during various times of the day and on different days of the week in order to identify fluctuations.

6. The additional sound signal that is proportional to the field strength makes the detection of field sources easy.

7. ME 3830B only: In order to faciliate manual measurements this instrument is equipped with an internal 16 Hertz high-pass filter. If used on a tripod this filter can be bypassed to reach the full frequency range down to 5 Hertz by a micro-switch, reachable through the hole on the top side of the instrument (switch position: lower end of the instrument).

Measurement Instructions - AC Electric Fields

According to relevant guidelines (TCO, MPR II, TÜV), prior to any electric field testing the field meter must be connected to ground potential through the supplied grounding cable in order to

obtain reliable, reproducible testing results. Without a proper connection to ground potential no reliable statements on AC electric fields can be made.

Grounding the Field Meter and the Person performing the Testing

Pic. 01

Unvarnished metal piping for water, gas or heating can be used to connect the grounding cable with its grounding clip. As an alternative, a licensed electrician could use an alligator clip to establish a grounding connection through the grounding conductor in a grounded outlet.
(**Warning:** If the phase conductor is touched, an electric shock most likely will result.)

Pic. 02

Insert the jack plug of the grounding lead into the dedicated socket ("ground", "ground icon") and at the same time run the ground wire along the side the case to the back.
Caution: Make sure that neither the ground wire nor the users hand is in the front of the instrument.

A ground rod to be driven into the soil and a bracket for bigger (pipes can be obtained at our local representative (see contact address at page 7).

2. Positioning of the Field Meter for AC Electric Field Testing

The field meter is calibrated for measurements taken in close proximity to the body. The field sources located behind the field meter are shielded through the body and thus misleading concentrations of field lines onto the electric field sensor are avoided. Therefore, try to avoid taking measurements with a stretched-out arm. In general, this would lead to higher testing results.

3. AC Electric Field Testing

Turn on the field meter and set the switch "Field Type" to "E" for AC electric field. (ME 3840B only: Turn the knob for the frequency filter to "50 Hz to 100 kHz")

During testing always ensure that the ground wire runs to the back of the case and that the person performing the survey, as well as anybody else present, is located behind the field meter.

Keep the field meter close to your body. The further away the instrument is held or even if it is put down, the more the testing results tend to become altered into the higher range. Either point to the suspected field source or if a concentrated source is not present, check the space systematically. Proceed as follows:

- First of all, move slowly through the room to be measured.
- Stop frequently and take measurements pointing to the back, to the left, to the right and to the ceiling. Always keep in mind that the grounding cable must run to the back of the instrument.
- Move in the direction of the highest reading in order to identify the field source.

- In the case of places where people spend substantial amounts of time, such as in bed or at a workplace, check all directions as mentioned above and make note of the orientation of the field meter at maximum readings. In such a case, a reference measurement of the absolute value should be taken as close to the body as possible.

When the field meter is placed on a tripod or on a table, it is necessary to also place a person 5 cm (2") behind the instrument to obtain accurate measurements. For reproducible measurements, a metal plate (50 cm x 50 cm) is required to be orthogonal and centered 5 cm behind the instrument.

An EMR survey of sleeping areas should include measurements made under "sleep conditions," with all electrical equipment turned off. Under certain circumstances the electric field can even increase after turning off electrical equipment , due to intensification of other sources.

Recommended Exposure Limit AC electric fields: Below 10 V/m, preferably below 1 V/m (at 50/60 Hz).

AC Magnetic Field Testing:

Turn on the field meter and set the switch "Field Type" to "M" for AC magnetic field. (ME 3840B only: Turn the knob for the frequency filter to "50 Hz to 100 kHz")

For reliable measurements of AC magnetic fields, neither the field meter nor the person performing the measurements needs to be grounded. Other persons or mass potentials in the vicinity of the field meter do not affect the testing results.

If a field source is suspected, point in that direction, otherwise check the space systematically. Proceed as follows:

- First of all, move slowly through the room to be measured. The magnetic sensor is positioned in such a way in the instrument that most typical field sources in residential settings are detected as long as the field meter is held horizontally. In addition, all three dimensions should be checked from time to time as shown in the pictures 03 - 05.

- In practice, the identification of a field source has proven to be most effective by locating the direction of the highest reading first. Then follow the direction, which continues to show increasing measurement values. Simply keep the field meter aligned in the direction of the maximum readings. For an accurate measurement, however, hold the instrument very steady or put it down at a relevant measurement point.

- In places of long duration such as the work place, sitting room and the bedroom, all three dimensions of AC magnetic fields should be checked each time. Proceed as follows.

Accurate Measurement of the Magnetic Field Strength in the Presence of Several Field Sources

In this event, it is necessary to take three separate measurements and record the readings The field meter should be held as shown in the pictures: point to the front (Picture 03), to the ceiling (Picture 04) and to the side so that it is perpendicular to the front axis (Picture 05).
Important: Let the display settle for 2 seconds after every change of direction.

Rough Estimation of resulting Magnetic Field Strength

Reading on Display	estimated resulting magnetic field strength
- One high, two low readings	~ highest reading
- Two higher, one lower reading	~ highest reading + half of 2nd highest reading
- Three roughly equal readings	~ 1.5 times highest reading

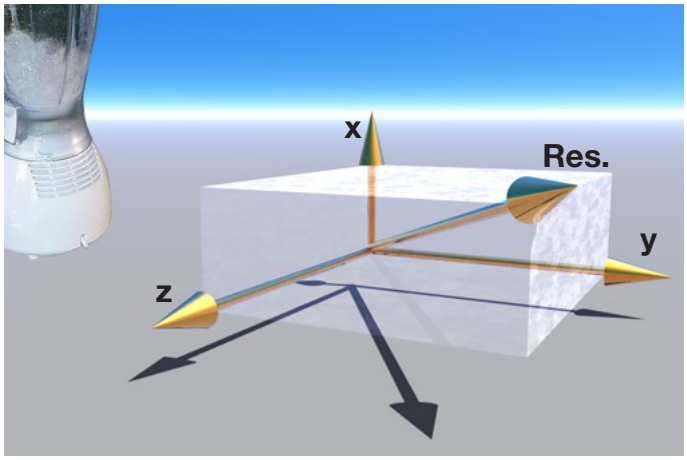
Pic. 03 Pic. 04 Pic. 05

Recommended Exposure Limit AC magnetic fields: Below 200 nT, preferably below 20 nT (at 50/60 Hz).

The resultant, total magnetic field strength (the sum of the single field strengths, 3-D Measurement) can be accurately calculated according to the following equation

Resultant Field Strength = Square root of ($x^2 + y^2 + z^2$)

Picture 06 illustrates the direction of the resultant field, which is also called "substitute field." The photos for pictures 03 through 05, showing the single measurements of the three dimensions, as well as picture 07 were taken in a kitchen during a typical testing session. By inserting the display values in the above equation, the result would come very close to the value which is displayed in picture 07. There, the field meter is held perpendicular to the resultant field.



Pic. 06

Pic. 07

Frequency Analysis with the ME3840B (AC Electric and Magnetic Fields)

An AC electric or magnetic field is not only defined by its field strength, but also by the frequency with which the polarity of the field changes. We encounter various common frequencies:

- Overhead railway wires operate at 16.7 Hz (only in Europe).
- The electric power grid (home wiring, high-tension power lines) operates at a 60-Hz frequency in North America and at a 50-Hz frequency in Europe. So-called "natural harmonics" are the multiples of the respective fundamental frequency (50 Hz or 60 Hz). They are present e.g. for public transformer stations.
- In addition, various electronic devices are used in our homes that generate a variety of fields with higher frequencies in the kHz range (artificial harmonics) such as switch-mode power adapters ("transformers"), ballasts of fluorescent tubing and energy saving lamps as well as dimmer switches with so-called switch mode technology and the like.

For the assessment of a certain area and especially with regards to appropriate remediation strategies, it is very useful to know how many of the different frequencies contribute to the total exposure. An exposure caused by overhead railway wires, for example, cannot be remedied by installations of the homeowner. However, it is possible to avoid certain signals of the kHz range by choosing devices without such emissions (e.g. incandescent lamp instead of fluorescent tubing) (only in Europe).

Frequency Analysis with internal Frequency Filter Module (F1B2H31)

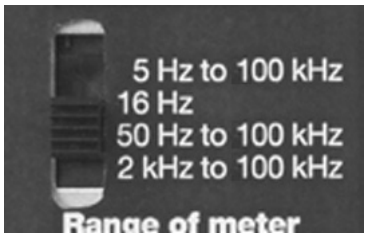


Abb. 8

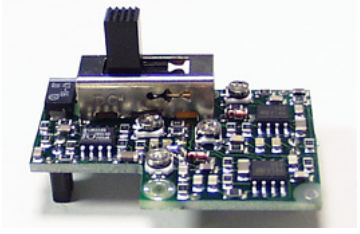


Abb. 9

The following frequencies can be selected:

1) 5 Hz to 100 kHz = Total frequency range of this meter, best suited for tripod measurements

2) 16.7 Hz = 4th order band pass filter with Q-Factor 10 for the frequency of overhead railway wires (only in Europe)

3) 50 Hz to 100 kHz = 5th order high pass filter for the electric power grid and its harmonics

4) 2 kHz to 100 kHz = 5th order high pass filter for so-called artificial harmonics above 2 kHz. This frequency range corresponds with band 2 of the Swedish TCO guidelines.

In order to measure fields of overhead railway wires or harmonics, first the respective filter in the field meter needs to be activated. Generally speaking, the testing follows the same principles as described in the section "Measurement Instructions" for the fields of the power grid system. There are only two points, which deserve special mention here:

- Usually the source of the railway currents is located outside of a house. It is recommended, nonetheless, that the entire house is roughly checked anyway because sometimes railway frequencies can also be found on, for example, water or gas piping as well as the electric wiring system due to coupling effects. If a house to be tested is closer than 2 to 3 km to an electric railway track, such potential sources should be checked to be on the safe side.

- "Artificial" harmonics usually are less energetic than power or railway frequencies and therefore show lower testing results. For this frequency band, however, all renowned institutes recommend exposure limits that are 10 times lower than those for power frequency fields. Therefore the frequency range "200 nT/Vm" is usually sufficient.

Note: Due to 1/f higher and white noise, filter tolerances, micromovements of the instrument and frequencies beyond the filtered frequency bands, the testing results of the position "5 Hz to 100 kHz" can deviate from the sum of the filtered values.

Auto-Power-Off, Low batt.

This function conserves energy and extends the total operating time.

1. In the case of the field meter not being turned off or if it is accidentally turned on during transportation, it will automatically be shut off after 40 minutes of continuous use.

2. When two dots appear in the center of the display (low batt.), the field meter will be turned off after 3 min. in order to avoid measurement errors.

Tone - signal

This instrument has a tone signal which works proportional to the field strengths. To work in this mode set the ON / OFF switch to the speaker symbol.

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