EXTECH INSTRUMENTS
A FLIR COMPANY

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PRODUCT DATASHEET

8GHz RF EMF Strength Meter

High Frequency measurement for EMF

Monitor high frequency radiation in the 10MHz to 8GHz frequency range

Features:

- For electromagnetic field strength measurement including mobile phone base station antenna radiation, RF power measurement for transmitters, wireless LAN (Wi-Fi) detection/installation, wireless communication applications (CW, TDMA, GSM, DECT) and microwave leakage
- Measurement optimized for 900MHz, 1800MHz, 2.7GHz, 3.5GHz and 8GHz
- Non-directional (isotropic) measurement with three-channel (triaxial) measurement probe
- Max Hold and Average functions
- Manual store/recall up to 99 sets
- Level exceed audible alarm with user selectable threshold
- Complete with 9V battery and carrying case

Applications

- RF electromagnetic wave field strength measurements
- Mobile phone base station antenna radiation power density measurement
- Radiation safety level tests
- Locating RF "Hot Spots" in the workplace or at home
- Microwave oven leakage tests
- RF "Electrosmog" detection
- Wireless network (Wi-Fi) RF detection

Specifications	
Sensor Type	Electric Field
Frequency Range	10MHz to 8GHz (optimized for 900MHz, 1800MHz, 2.7GHz, 3.5GHz & 8GHz)
Units of Measure	mV/m, V/m, µA/m, mA/m, µW/m², mW/m², W/m², µW/cm², mW/cm²
Measuring Ranges	20mV/m to 108.0V/m 53µA/m to 286.4mA/m 1µW/m² to 30.93W/m² 0µW/cm² to 3.093mW/cm²
Resolution	0.1mV/m, 0.1µA/m, 0.1µW/m², 0.001µW/cm²
Audible Alarm	Adjustable threshold with On/Off
Memory	Manual store/recall of 99 sets
Dimensions	2.6x2.4x9.7" (67x60x247xmm)
Weight	8.8oz (250g)

CE

Introduction

This meter is a broadband device for monitoring high-frequency radiation in the range of **10MHz to 8GHz**. The non-directional electric field and high sensitivity also allow measurements of electric field strength in TEM cells and absorber rooms.

The unit of measurement and the measurement types are expressed in units of electrical and magnetic field strength and power density.

At high frequencies, the power density is of particular significance. It provides a measure of the power absorbed by a person exposed to the field. This power level must be kept as low as possible at high frequencies. The meter can be set to display the instantaneous value, the maximum value measured or the average value. Instantaneous and maximum value measurements are useful for orientation, e.g. when first entering an exposed area.

- ❑ 10MHz to 8 GHz Frequency range.
- ❑ For isotropic measurements of electromagnetic fields.
- ❑ Non-directional (isotropic) measurement with three-channel measurement sensor.
- ❑ High dynamic range due to three-channel digital processing.
- ❑ Configurable alarm threshold and memory function.

Fundamentals

- **Electromagnetic Radiation**
  This meter is used to indicate radiated electromagnetic fields. Wherever there is a voltage or a current, electric (E) and magnetic (H) fields arise. Examples include the electromagnetic fields from radio broadcasting and TV transmitters.
- **Electric Field Strength**
  This is a field vector quantity that represents the force (F) on an infinitesimal unit positive test charge (q) at a point divided by that charge. Electric field strength is expressed in units of volts per meter (V/m).
  Use the units of electric field strength for measurements in the following situations:
  • In the near-field area of the source.
  • Where the nature of the electromagnetic field is unknown.
- **Magnetic field strength (H) :**
  This is a field vector that is equal to the magnetic flux density divided by the permeability of the medium. Magnetic field strength is expressed in units of amperes per meter (A/m).
- **Power density (S) :**
  Power per unit area in the direction of propagation, usually expressed in units of watts per square meter (W/m2) or, for convenience, units such as milliwatts per square centimeter (mW/cm2).
- **The characteristic of electromagnetic fields :**
  Electromagnetic fields propagate as waves and travel at the speed of light (c). The wavelength is proportional to the frequency.

$$\lambda(\text{wavelength}) = \frac{c\ (\text{speed of light})}{f\ (\text{frequency})}$$

Near-field is assumed if the distance to the field source is less than three wavelengths. For far-fields, the distance is more than three wavelengths. In the near-field, the ratio of electric field strength (E) and magnetic field strength (H) is not constant, so measure each separately. In the far-field, however, it is enough to just measure one field quantity, and compute the other accordingly.

Operation

E-field sensors

The 3-channel sensor is located at the top of the meter. The three voltages generated by the sensor are fed back to the meter. In far-fields, an E-field sensor is preferable due to the greater bandwidth. The E-field sensor frequency ranges from **10MHz to 8 GHz**.

The meter is a small portable instrument that measures the electric field in the atmosphere of the sensor's surroundings. The measurement of the field is done by moving the aerial of the sensor in the desired measured environment.

A direct wide band measurement is obtained of the field that the measurement sensor is subjected to. To find the value of the field emitted by a source of interference, simply point the aerial towards it and get as close as possible (the value of the field is inversely proportional to the distance of the sensor/emission source). The operator must take care not to be between the source of disturbance and the zone to be checked. The human body shields electromagnetic fields. The E-field sensor is isotropic; it does not require special handling. It measures the field according to 3 axes without the aerial having to be moved in the 3 planes. Simply point it at the target to make the measurement.

Explanatory notes

Units of measurement

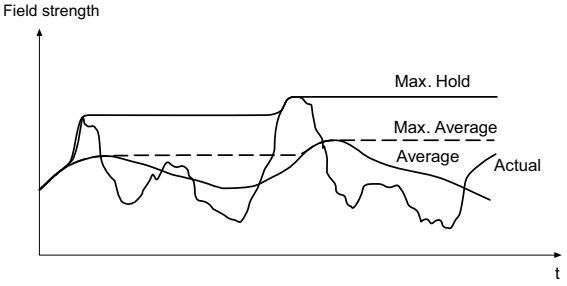
The meter measures the electrical component of the field; the default units are those of electrical field strength (mV/m, V/m). The meter converts the measurement values to the other units of measurement, i.e. the corresponding magnetic field strength units (μA/m, mA/m) and power density units (μW/m^2 , mW/m^2 or μW/cm^2) using the standard far-field formulate for electromagnetic radiation.

The conversion is invalid for near-field measurements, as there is no generally valid relationship between electrical and magnetic field strength in this situation. Always use the default units of the sensor when making near-field measurements.

Result modes

The bar graph display always shows each axis (X, Y or Z) the instantaneous measured dynamic range value. The digit display shows the measurement according to one of four selectable modes:

- **Instantaneous**: The display shows the last value measured by the sensor, no symbol is displayed.
- **Maximum instantaneous (MAX):** The digital display shows the highest instantaneous value measured, the "MAX" symbol is displayed.
- **Average (AVG):** The digital display shows the average value measured, the "AVG" symbol is displayed.
- **Maximum average (MAX AVG):** The digital display shows the highest average value measured, the "MAX AVG" symbol is displayed.



Specifications

General Specifications

Measurement method:	Digital, triaxial measurement.
Directional characteristic:	Isotropic, triaxial.
Measurement range selection:	One continuous range.
Display resolution:	0.1mV/m, 0.1μA/m, 0.1μW/m^2, 0.001μW/cm^2
Setting time: T	Typically 1s (0 to 90% of measurement value).
Display refresh rate:	Typically 0.5 seconds
Display type:	Liquid-crystal display (LCD), 4 digit.
Audible alarm:	Buzzer.
Units:	mV/m, V/m, μA/m, mA/m, μW/m^2, mW/m^2, W/m^2 μW/cm^2, mW/cm^2
Display value:	Instantaneous measured value, maximum value, or maximum average value.
Alarm function:	Adjustable threshold with ON/OFF.
D**ata memory and read storage**:	99 data sets.
Dry batteries:	9V NEDA 1604/1604A
Battery life: >	3 hours
Auto power off:	5 minutes.
Operating temperature range:	0°C to +50°C
Operating humidity range:	5% to 75%RH
Storage temperature range:	-10°C to +60°C
Storage humidity range:	0% to 80%RH
Dimensions:	Approx. 67(W)×60(T)×247(L)mm.
Weight (including battery):	Approx. 250g

Electrical Specifications

Unless otherwise stated, the specifications hold under the following conditions:

- The meter is located in the far-field of a source, the sensor head is pointed towards the source.
- Ambient temperature: +23□±3□
- Relative air humidity: 25% to 75%

Sensor type:	Electrical field (E)
Frequency range:	10MHz to 8GHz
Specified measurement range:	
CW signal (f > 50MHz):	20mV/m to 108.0V/m 53μA/m to 286.4mA/m 1μW/m^2 to 30.93W/m^2 0μW/cm^2 to 3.093mW/cm^2
Dynamic range:	Typically 75dB
Absolute error at 1 V/m & 50 MHz:	±1.0dB
Frequency response:	
Sensor (with typical CAL factors):	±1.0dB (50MHz to 1.9GHz) ±2.4dB (1.9GHz to 8GHz)
Isotropy deviation:	Typically ±1.0dB (f>50MHz)
Overload limit:	10.61mW/cm^2 (200V/m)
Thermal response (0 to 50°):	±0.5dB