



Instruction Manual

IM-195

3-Axis RF Field Strength Meter

EN





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Introduction:

IM-195 is designed for measuring Radio Frequency (RF) electromagnetic field strength and the monitor range is from 50MHz to 3.5GHz with triple axis X, Y and Z isotropic sensors.

It is used to indicate electromagnetic pollution generated by cellular phone tower antenna, wireless internet, microwave ovens, cellular phones and cordless phones, etc.

With its simple method of operation this meter will measure electromagnetic pollution generated artificially. Wherever there is a voltage or a current, electric (E) and magnetic (H) fields arise. All types of radio broadcasting and TV transmitters produce electromagnetic fields. They also arise in industry, business and the home.

Electric field strength (E):

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 (mV/m). This meter measures electric field strength directly.

Magnetic field strength (H):

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). In far field situations, one can calculate the magnetic field from the electric field value. This meter can display the calculated Magnetic field strength.

Power density (S):

Power per unit area perpendicular to the direction of propagation usually expressed in units of Watts per square meter (W/m^2) or, for convenience, units such as mili/Watts per square centimeter (mW/cm^2).

The characteristic of electromagnetic fields:



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Electromagnetic fields propagate as waves and travel at the speed of light (C). The wavelength is proportional to the frequency:

$$\text{(Wavelength)} = C \text{ (speed of light)} / f \text{ (frequency)}$$

If the distance to the field source is less than three wavelengths, then we are usually in the near field.

If the distance is more than three wavelengths, the far-field conditions usually hold. In near field conditions, the magnetic field value cannot be calculated from the electric field value.

This meter is designed for reliable far field measurements only.

Features:

- The auto-ranging units of measurement and the measurement types have been selected to expressed in units of electrical and magnetic field strength and power density.
- Non-directional (isotropic) measurement with three-axis measurement sensor.
- Selectable display functions of the instantaneous value, the maximum value measured or the average value.
- Configurable alarm threshold function.
- This meter is capable of recording 200 measurements.
- Low battery and over load indications

General specification:

- Display: LCD display with maximum reading of 3999.
- Sampling Rate: 2.5 times per second.
- Sensor: Triple axis.
- Frequency Range: 50MHz to 3.5GHz.
- Accuracy: ± 1 dB at 2.45GHz.
- Measurement Units: mV/m, V/m, μ A/m or mA/m, μ W/m², mW/m², μ W/cm².

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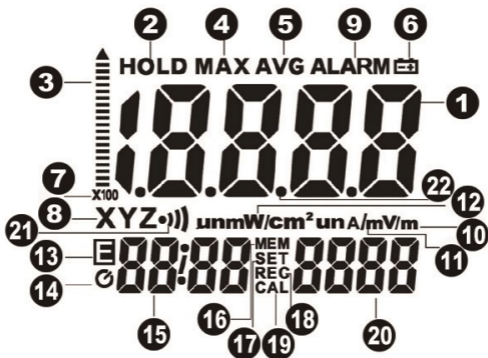
- Specified measurement range:
 1. CW signal ($f > 50\text{MHz}$) :
 38mV/m to 11.00V/m , $53.0\mu\text{A/m}$ ~ 29.28mA/m ,
 $0.01\mu\text{W/m}^2$ ~ 323.3mW/m^2 , $0.001\mu\text{W/cm}^2$ ~ $32.33\mu\text{W/cm}^2$
 2. Dynamic range: Typically 75dB.
 3. Absolute error at 1V/m and 2.45GHz : ± 1.0 dB.
- Frequency response :
 1. Sensor taking into account the typical CAL factor :
 $\pm 2.4\text{dB}$ (50 MHz to 1.9 GHz).
 ± 1.0 dB (1.9 GHz to 3.5GHz).
 2. Isotropy deviation: Typically ± 1.0 dB (2.45GHz).
 3. Overload limit: $32.33\mu\text{W/cm}^2$ (11 V/m) per axis.
 4. Overload limit (0 to 50°C): $\pm 0.2\text{dB}$.
- Power Supply: 9V NEDA 1604, IEC 6F22,
JIS 006 P. battery x 1pc.
- Battery life: About 15 hours
- Dimension: 55mm x 38mm x 195mm (LxWXH)
- Weight: Approx. 200g with battery installed
- Accessories: Manual, 9V battery and carrying bag.

Instrument description:



1. RF sensor (Triple-axis).
2. LCD.
3. MAX/ AVG/ (\rightarrow)
4. Record / Time/ (\leftarrow).
5. Power on/off.
6. Unit/ Enter.
7. Hold/ ALARM / (\uparrow).
8. Backlight/ Set
9. XYZ/ MEM (\downarrow).
10. Protection holster.
11. Tripod mounting screw.
12. Battery cover.

LCD description:




- | | |
|--|---|
| 1. Primary display | 12. $\mu\text{W}/\text{m}$, $\mu\text{W}/\text{cm}^2$ unit |
| 2. Hold | 13. E symbol |
| 3. Analogue bar graph | 14. Auto power off |
| 4. MAX | 15. Time unit |
| 5. AVG | 16. MEM reading |
| 6. Low battery | 17. SET |
| 7. $\times 100$ | 18. REC |
| 8. X.Y.Z | 19. CAL |
| 9. ALARM | 20. Secondary Display |
| 10. mV/m , $\text{V}/\text{m}(\text{E})$ | 21. Buzzer |
| 11. $\mu\text{A}/\text{m}$, $\text{mA}/\text{m} (\text{H})$ | 22. Decimal point |

Safety:






CAUTION

Be extremely careful for the following conditions while measuring.

- Do not operate the meter in the environment with explosive gas (material), combustible gas (material) steam or filled with dust.
- In order to avoid reading incorrect data, please replace the battery immediately when the symbol  appears on the LCD.
- In order to avoid the damage caused by contamination or static electricity, do not touch the circuit board before you take any adequate action.
- Operating Environment is for indoors use only. The meter was designed for being used in an environment of pollution degree 2.
- Operation Altitude: Up to 2000M.
- Operating Temperature & Humidity: 0°C ~ 50°C, 25%~75%RH.
- Storage Temperature & Humidity: -10°C ~ 60°C, 0%~80%RH.

Operation:

1. Press  to turn the power on or off.
2. Turn the meter on; press  repeatedly to select the displayed value of XYZ (all axes).
3. Position the sensor of the meter to RF strength source and hold the meter steady during the measurement.
4. The LCD displays the measured value.
5. Press  repeatedly to select the desired unit to be shown on the LCD (we recommend using mV/m).
6. After the testing, turn the meter off.



Important:

If the sensor is moved quickly, excessive field strength values could be displayed. This effect is caused by electrostatic charges.

Short-term measurements

Use either the “instantaneous” or the “Max instantaneous” mode, if the characteristics and orientation of the field are unknown when entering an area exposed to electromagnetic radiation.

Hold the meter at arm's length.

Make several measurements at various locations around your work place or the interested areas as described above. This is particularly important if the field conditions are unknown and possibly dangerous.



Pay special attention to measuring the vicinity of possible radiation sources. Apart from active sources, those components connected to a source may also act as radiators. For example, the cables used in diathermy equipment may also radiate electromagnetic energy. Note that metallic objects within the field may locally concentrate or amplify the field from a distant source.

Long-term exposure measurements

Place the meter between yourself and the suspected source of radiation. Make measurements at those points where parts of your body are nearest to the source of radiation.

Note: Use the Average or Max average modes only when the instantaneous measurement values are fluctuating greatly. You may fix the meter to a wooden or plastic tripod.


HOLD

Freezes the reading present on the LCD at the moment when  is pressed and LCD shows HOLD. Press  again to disable data hold.

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UNIT

Press  repeatedly to change the units of mV/m (V/m), $\mu\text{A/m}$ (mA/m), $\mu\text{W}/\text{m}^2$ (mW/m²) or $\mu\text{W}/\text{cm}^2$.




Electric field strength (V/m)

Computed magnetic field strength (mA/m)


Computed power density (mW/m²)


Computed power density ($\mu\text{W}/\text{cm}^2$)

MAX / AVG

Press  repeatedly to select the displayed reading from MAX to AVG to MAX/AVG and back to MAX.

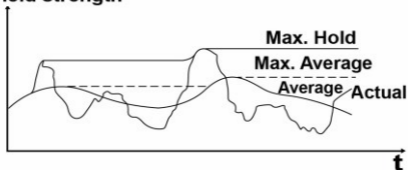


Press and hold  for more than 3 seconds to disable this function.

The maximum averaging storage is up to 99 minutes and 99 seconds. After this period of time, updating will stop automatically and the LCD displays .

The following graph shows of Instantaneous (actual), MAX (hold), AVG and MAX/AVG:

Field strength



REC

Press to save the current measured result in meter's memory; the LCD shows REC with a number 001 to 200. The meter records up to 200 data sets.



Over load indication shows:



XYZ

Press repeatedly to select the sensor axis:

All axis XYZ → X axis → Y axis → Z axis



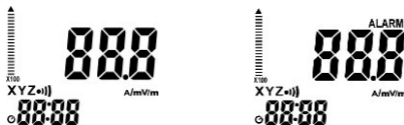
Backlit

Press to turn the backlit on. Press this button to turn the backlit off. To save the battery life, the meter automatically turns the backlit off after 30 seconds.

ALAM (alarm)



Press and hold and together to switch the alarm function on, the display shows ALAM. To switch the alarm function off, repeat this process.

When the alarm sounds, the display shows .




MEM (view the saved data)



Press and hold  and  together to view the saved data

Use  or  to view the next or previous records.



Press  to exit this mode.

TIME


Press and hold , and press  repeatedly to display the time method of the Year, Month, Date, Hour and Second. This meter's clock uses 24 hour time setting.

Default time mode setting is "2010/01/07 00 : 02" ":00".

00:20 12,31 2009 :15

SET

Press and hold  and  together to enter the setup mode.



Press  to scroll through the setup function.



There are 6 functions in the setup mode:


1. Clock setup.
2. Setting the alarm limit value (ALARM).
3. Clear all data memory.
4. Analogue bar graph x1 x10 x100.
5. Auto power off time.
6. Setting the calibration factor (CAL).

1. Clock setup:

Press and hold  and  together to enter the first setup function. The clock is 24 hour time setting.

Press  or  to select desired digit (hour→ minute year→ month→ day).

Press  or  to change the value.

Press  to save the setting and exit the SET mode.

Date/time default format: 2009/12/21 12:12.

Year format: 2000 ~2099 display as 00 ~ 99.

1231 1231 1231
 08:38^{SET} 2009 08:38^{SET} 2009 09:38^{SET} 2009

1221 1221 1221
 09:38^{SET} 2009 09:38^{SET} 2009 09:38^{SET} 2009

2. Setting the alarm limit value (ALARM).


The alarm limit value determines the level at which the alarm will sound. The alarm limit value can be edited only in the V/m unit; the setting range is from 0.001 to 999.9 V/m. The ALARM default is set at 999.9 V/m.


Alarm limit function is only used for the total of three axial values.

Press and hold  and  together to enter the setup mode.



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Press  1 more time to enter the alarm setting function, the readout value is flashing and V/m unit is displayed.

Press  to move decimal.

Press  to select the desired digit.


Press  or  to change the value.

Press  to store the new setting value and exit the SET mode.





3. Clear data


Press and hold  and  together to enter the setup mode.

Press  button 2 more times to enter clear data function, the display shows:






To exit without clearing data, press .

Press  to select "YES".



Press  to clear all the data in the memory and exit the SET mode.

4. Analog bar graph x1 x10 x100.

Press and hold  and  together to enter the setup mode.

Press  button 3 more times to enter the analogue bar graph setting mode.

The bar graph symbol is flashing. The current setting of x1, x10, or x100 is displayed at bottom of graph. X1 is normal setting. X10 is 10 times more sensitive, x100 is 100 times more sensitive.

Press  to increase the sensitivity or  to reduce the sensitivity.



X100

SET



X10

SET




X1



SET



Press  to save the setting and exit the SET mode.


5. Auto power off time

Press and hold  and  together to enter the setup mode.

Press  button 4 more times to enter the auto power off setting mode.

Press  and  button to change the value. The auto power off time default setting is 15 minutes.


Press  to save the new setting value and exit the SET mode. The symbol  is displayed. The maximum auto power off time setting is 99 minutes.

Set the value to :00 to disable auto power off, the symbol  is not displayed.






5. Setting the calibration factor (CAL)

Press and hold  and  together to enter the setup mode.


Press  button 5 more times to enter the calibration factor setting mode.

The “CAL” is shown at the center bottom of the display. The CAL setting range is from 0.10 to 9.99.

The default setting is 1.00, which is appropriate for most situations.

Press  or  to select the desired digit.

Press  or  to change the digit.

Press  to save the new setting value and exit the SET mode.



CAL



CAL



CAL

NOTE:


The calibration factor CAL serves to calibrate the display for a specific frequency when the frequency of a single signal is known. The field strength value measured internally is multiplied by the value of CAL that has been entered and the resulting value is displayed. The CAL factor is often used as a means of entering the sensitivity of the field sensor in terms of its frequency response in order to improve measurement accuracy.



Battery Replacement:

The meter is powered by 9V battery x 1pc.

Use the following procedure to replace the battery:

1. Replace battery immediately when the LCD displays  .
2. Turn the meter off and remove the battery cover.
3. Replace with the new battery; take care to note the correct polarity.
4. Re-install the battery cover.

Limited Warranty:

This meter is warranted to the original purchaser against defects in material and workmanship for 3 year from the date of purchase. During this warranty period, RS Components will, at its option, replace or repair the defective unit, subject to verification of the defect or malfunction. This warranty does not cover fuses, disposable batteries, or damage from abuse, neglect, accident, unauthorized repair, alteration, contamination, or abnormal conditions of operation or handling.

Any implied warranties arising out of the sale of this product, including but not limited to implied warranties of merchantability and fitness for a particular purpose, are limited to the above. RS Components shall not be liable for loss of use of the instrument or other incidental or consequential damages, expenses, or economic loss, or for any claim or claims for such damage, expense or economic loss. Some states or countries laws vary, so the above limitations or exclusions may not apply to you. For full terms and conditions, refer to the RS website.



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