

# TENMARS

## MULTI-FIELD EMF METER

### TM-190

### User's Manual










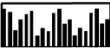

HB2TM1900002


## Meun

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## 1 Features

- Data hold (HOLD)
- Low battery indication : HIGH  LOW 
- Over load display "OL".
- External USB Power Supply: "  "
- Brightness options: low-Middle-high
- Magnetic unit : Gauss(mG) or. Tesla(uT)
- RF Strength Unit: ( $\mu\text{W}/\text{m}^2 \sim \text{mW}/\text{m}^2$ ) ( $\mu\text{W}/\text{cm}^2$ ) (m V/m  $\sim$  V/m) (mA/m) (dBm).
- Languages: English; Traditional Chinese; Simplified Chinese; Japanese; Español.
- Power Off Time : No; 1; 3; 5; 10; 15; 30. Factory default sets as "5". Settings can be changed by the user.  is displayed on the screen after power off time is set.
- Keys/Alarm Sounds: On ; Off 
- Low-Frequency EMF Readings: Individual and aggregated XYZ axial readings  ELF SENSOR.
- RF Historical Records:  Up to 20 groups
- Information: Software version: V1.0
- High-frequency EMF Readings: Please perform tests according to the indicated direction  RF SENSOR.

- Electric field Measurement Precautions: Please perform tests according to the indicated direction . Please hold the meter at the bottom of the display, as shown in the figure below:

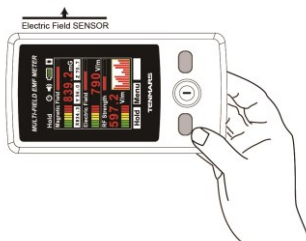


Fig. 1 Electric Field measurement:

	Magnetic Fields	Electric Field	RF strength
The Green zone	0~10.00mG	0~500V/m	0~0.99mW/m <sup>2</sup> ;0~0.59V/m
The Yellow zone	10.01~100mG	501~1000V/m	1~9.99mW/m <sup>2</sup> ;0.6~1.9V/m
The Red zone	101~2000mG	>1001V/m	>10mW/m <sup>2</sup> >2V/m

The color zones are for reference only

- electromagnetic safety reference standard

international 國際的	Council Recommendation1999/519/EC	42V/m(4.75W/m <sup>2</sup> )	59V/m(9.25W/m <sup>2</sup> )
international 國際的	ICNIRP Guidelines, April1998	42V/m(4.75W/m <sup>2</sup> )	59V/m(9.25W/m <sup>2</sup> )
Austria 奥地利	ONORM S1120	49V/m(6.33W/m <sup>2</sup> )	61V/m(10W/m <sup>2</sup> )
Belgium 比利時	Belgisch Staatsblad F.2001-1365	21V/m(1.18W/m <sup>2</sup> )	30V/m(2.31W/m <sup>2</sup> )
Germany 德國	26.Deutsche Verordnung	42V/m(4.75W/m <sup>2</sup> )	59V/m(9.25W/m <sup>2</sup> )
Italy 意大利	Decreto n.381,1998	20V/m(1W/m <sup>2</sup> )	20V/m(1W/m <sup>2</sup> )
the netherlands 荷蘭	Health Council	51V/m(6.92W/m <sup>2</sup> )	83V/m(18W/m <sup>2</sup> )
switzerland 瑞士	Verordnung 1999	4V/m(0.04W/m <sup>2</sup> )	6V/m(0.1W/m <sup>2</sup> )
united states 美國	IEEE C95.1	49V/m(6.33W/m <sup>2</sup> )	68V/m(12W/m <sup>2</sup> )
china 中國	Draft:National Quality Technology Monitoring Bureau	49V/m(6.33W/m <sup>2</sup> )	61V/m(10W/m <sup>2</sup> )
japan 日本	Radio-Radiation Protection Guidelines,1990	49V/m(6.33W/m <sup>2</sup> )	61V/m(10W/m <sup>2</sup> )

$$1\text{W/m}^2=0.1\text{mW/Cm}^2=100\text{uW/Cm}^2.1\text{mW/m}^2=0.1\text{uW/Cm}^2$$

## 2 Identifying Parts

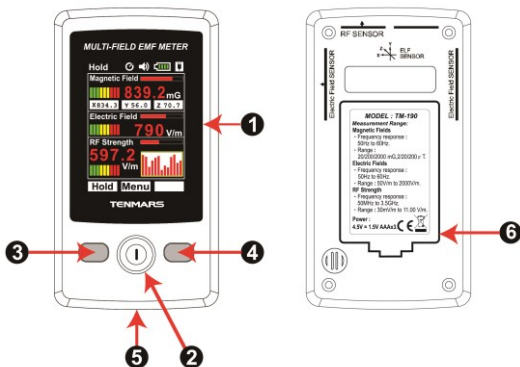
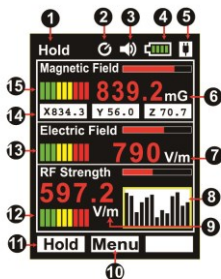


Fig. 2 Instrument description:

1. 2.4" 240\*320 resolution color TFT.
2. Power and Menu button
3. Hold and Enter button
4. Select and Down button
5. Mini USB power interface
6. Battery cover



## 3 TFT description



- 1 Data Hold indicator.
- 2 Auto power off indicator.
- 3 Buzzer indicator.
- 4 Battery indicator.
- 5 Connecting a USB power indicator.
- 6 Tesla(uT) or Gauss(mG) display.
- 7 Electric Field (V/m) display.
- 8 RF strength history histogram display.
- 9 RF strength digital (mV/m/ W/m<sup>2</sup> /  $\mu$  W/cm<sup>2</sup>/dB) display.
- 10 Menu key indication
- 11 Hold/ Enter key indicator
- 12 RF electronic field warning indicator
- 13 LF electric field warning indicator
- 14 Individual XYZ axial value of LF electromagnetic wave display
- 15 LF electromagnetic wave warning indicator'

## **4 Measurement Procedures**

### **4.1 POWER ON/OFF Button:**

- Press  button to power on. LCD display measurement screen.(see Fig. 3)
- Press  button for 3 seconds to power off LCD display.

### **4.2 Reading Individual and Aggregated XYZ Axial Data:**


Direct the front section of the meter at the desired electromagnetic field for measurements.


The meter simultaneously displays the electromagnetic field readings of individual and aggregated XYZ axes, where the aggregated calculation equation can be expressed as follows:


$$B = \sqrt{B_x^2 + B_y^2 + B_z^2}$$

Because of environment-related magnetic field factors, this electromagnetic field EMF meter may display a reading of under 0.50 mG prior to testing. This is caused by the magnetic noise in the environment, rather than meter failure.

### **4.3 Data hold (HOLD):**


Press the left button as  to activate the HOLD function and hold the current readings at the upper left of the display.


To release the held data, press the left  button again.


Press the middle  button for 3 seconds to power off the meter.



### **4.4 Menu Settings:**




On the measurement screen: Press the middle  button to enter the main menu, where 7 options can be selected, namely, **Brightness, Magnetic unit, RF Strength Unit, Language, Power off, Sound, and Information.**

Press the right  button to make the blue brick scroll down.



Press the right  button repeatedly, and the blue brick will cycle through the options.

Press the left  button to enter the selected option. Press the left  button again to exit the selected option and return to the main menu.


Press the middle  button to return to the previous menu.



## 4.4.1. Option Buttons:

Press the right  button to scroll to and check the next check box. Press the right  button repeatedly to cycle through the check boxes.

Press the left  button to exit to the main menu.

Press the middle  button to return to the previous setting menu.



## 4.4.2. Screen Brightness options:

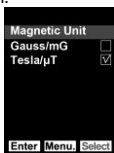
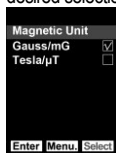
Following the operation procedures in 4.4, the Brightness setting comprises the following three options, namely, **Low**, **Middle**, and **High**. Under the sub-directory, use the option buttons to select and confirm the desired selection.



Default: Middle

## 4.4.3. Magnetic Unit:

Following the operation procedures in 4.4, the Magnetic Unit setting comprises the following two options, namely, **Gauss/mG** and **Tesla/uT**. Under the sub-directory, use the option buttons to select and confirm the desired selection.



Default: mG

## 4.4.4. RF Strength Unit :

Following the operation procedures in 4.4, the **RF Strength Unit** setting comprises the following five options, namely,  $\mu\text{W}/\text{m}^2 \sim \text{mW}/\text{m}^2$ ,  $\mu\text{W}/\text{cm}^2$ ,  $\text{mV}/\text{m} \sim \text{V}/\text{m}$ ,  $\text{mA}/\text{m}$ , and  $\text{dBm}$  (files are automatically skipped within the selected unit). Under the sub-directory, use the option buttons to select and confirm the desired selection.

RF Strength Unit	
$\mu\text{W}/\text{m}^2$ $\text{mW}/\text{m}^2$	<input checked="" type="checkbox"/>
$\mu\text{W}/\text{cm}^2$	<input type="checkbox"/>
$\text{mV}/\text{m}$ $\text{V}/\text{m}$	<input type="checkbox"/>
$\text{mA}/\text{m}$	<input type="checkbox"/>
$\text{dBm}$	<input type="checkbox"/>

Enter Menu. Select

RF Strength Unit	
$\mu\text{W}/\text{m}^2$ $\text{mW}/\text{m}^2$	<input type="checkbox"/>
$\mu\text{W}/\text{cm}^2$	<input checked="" type="checkbox"/>
$\text{mV}/\text{m}$ $\text{V}/\text{m}$	<input type="checkbox"/>
$\text{mA}/\text{m}$	<input type="checkbox"/>
$\text{dBm}$	<input type="checkbox"/>

Enter Menu. Select

RF Strength Unit	
$\mu\text{W}/\text{m}^2$ $\text{mW}/\text{m}^2$	<input type="checkbox"/>
$\mu\text{W}/\text{cm}^2$	<input type="checkbox"/>
$\text{mV}/\text{m}$ $\text{V}/\text{m}$	<input checked="" type="checkbox"/>
$\text{mA}/\text{m}$	<input type="checkbox"/>
$\text{dBm}$	<input type="checkbox"/>

Enter Menu. Select

RF Strength Unit	
$\mu\text{W}/\text{m}^2$ $\text{mW}/\text{m}^2$	<input type="checkbox"/>
$\mu\text{W}/\text{cm}^2$	<input type="checkbox"/>
$\text{mV}/\text{m}$ $\text{V}/\text{m}$	<input type="checkbox"/>
$\text{mA}/\text{m}$	<input checked="" type="checkbox"/>
$\text{dBm}$	<input type="checkbox"/>

Enter Menu. Select

RF Strength Unit	
$\mu\text{W}/\text{m}^2$ $\text{mW}/\text{m}^2$	<input type="checkbox"/>
$\mu\text{W}/\text{cm}^2$	<input type="checkbox"/>
$\text{mV}/\text{m}$ $\text{V}/\text{m}$	<input type="checkbox"/>
$\text{mA}/\text{m}$	<input type="checkbox"/>
$\text{dBm}$	<input checked="" type="checkbox"/>

Enter Menu. Select

Default:  $\mu\text{V}/\text{m}^2 \sim \text{mW}/\text{m}^2$

## 4.4.5. Language:

Following the operation procedures in 4.4, the Language setting comprises the following five options, namely, English, Traditional Chinese, Simplified Chinese, Japanese, and Español (Spanish). Under the sub-directory, use the option buttons to select and confirm the desired selection.

Language	
English	<input checked="" type="checkbox"/>
繁體中文	<input type="checkbox"/>
簡體中文	<input type="checkbox"/>
日本語	<input type="checkbox"/>
Español	<input type="checkbox"/>

Enter Menu. Select

Language	
English	<input type="checkbox"/>
繁體中文	<input checked="" type="checkbox"/>
簡體中文	<input type="checkbox"/>
日本語	<input type="checkbox"/>
Español	<input type="checkbox"/>

Enter Menu. Select

Language	
English	<input type="checkbox"/>
繁體中文	<input type="checkbox"/>
簡體中文	<input checked="" type="checkbox"/>
日本語	<input type="checkbox"/>
Español	<input type="checkbox"/>

Enter Menu. Select

Language	
English	<input type="checkbox"/>
繁體中文	<input type="checkbox"/>
簡體中文	<input type="checkbox"/>
日本語	<input checked="" type="checkbox"/>
Español	<input type="checkbox"/>

Enter Menu. Select

Language	
English	<input type="checkbox"/>
繁體中文	<input type="checkbox"/>
簡體中文	<input type="checkbox"/>
日本語	<input type="checkbox"/>
Español	<input checked="" type="checkbox"/>

Enter Menu. Select

**Default: English**

### 4.4.6. Power Off Time:

Following the operation procedures in 4.4, the Power Off setting comprises the following seven options, namely, NO, 1, 3, 5, 10, 15, and 30 (min). Under the sub-directory, use the option buttons to select and confirm the desired selection.

Power off	
NO	<input checked="" type="checkbox"/>
1	<input type="checkbox"/>
3	<input type="checkbox"/>
5	<input type="checkbox"/>
10	<input type="checkbox"/>
15	<input type="checkbox"/>
30	<input type="checkbox"/>
Enter Menu. Select	

Power off	
NO	<input type="checkbox"/>
1	<input checked="" type="checkbox"/>
3	<input type="checkbox"/>
5	<input type="checkbox"/>
10	<input type="checkbox"/>
15	<input type="checkbox"/>
30	<input type="checkbox"/>
Enter Menu. Select	

Power off	
NO	<input type="checkbox"/>
1	<input type="checkbox"/>
3	<input checked="" type="checkbox"/>
5	<input type="checkbox"/>
10	<input type="checkbox"/>
15	<input type="checkbox"/>
30	<input type="checkbox"/>
Enter Menu. Select	

Power off	
NO	<input type="checkbox"/>
1	<input type="checkbox"/>
3	<input type="checkbox"/>
5	<input checked="" type="checkbox"/>
10	<input type="checkbox"/>
15	<input type="checkbox"/>
30	<input type="checkbox"/>
Enter Menu. Select	

Power off	
NO	<input type="checkbox"/>
1	<input type="checkbox"/>
3	<input type="checkbox"/>
5	<input type="checkbox"/>
10	<input checked="" type="checkbox"/>
15	<input type="checkbox"/>
30	<input type="checkbox"/>
Enter Menu. Select	

Power off	
NO	<input type="checkbox"/>
1	<input type="checkbox"/>
3	<input type="checkbox"/>
5	<input type="checkbox"/>
10	<input type="checkbox"/>
15	<input checked="" type="checkbox"/>
30	<input type="checkbox"/>
Enter Menu. Select	

Power off	
NO	<input type="checkbox"/>
1	<input type="checkbox"/>
3	<input type="checkbox"/>
5	<input type="checkbox"/>
10	<input type="checkbox"/>
15	<input type="checkbox"/>
30	<input checked="" type="checkbox"/>
Enter Menu. Select	

Default: 5min

## 4.4.7. Sound on/off:

Following the operation procedures in 4.4, the Sound setting comprises the following two options, namely, On and Off.

Press the right **Select** button to scroll to and check the next check box. Press the right **Select** button to cycle through the options.

Press the left **Enter** button to select the "Enable" setting and enter the Keys/Alarm Sound menu (Section 4.4.8).

Press the left **Enter** button to select the "Disable" setting and return to the main menu (Fig. 3).

Press the middle **Enter** button to return to the measurement screen

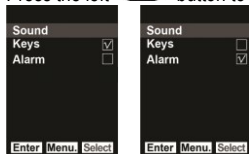


## 4.4.8. Keys/Alarm Sound:

Following the selection of the Enable option in the Sound settings menu, the Keys/Alarm Sound setting comprises the following two options, namely, Keys and Alarm.

Press the right **Select** button to scroll to and check the check the next check box. Press the right **Select** button repeatedly to cycle through the options.

Press the left **Enter** button to enter the next options screen.



## 4.4.9. Keys Sound:

Following the selection of the Keys option in the Keys/Alarm Sound settings menu, the Keys setting comprises 3 options, namely 1, 2, and 3.

Press the right **Select** button to scroll to and check the next check box. Press the right **Select** button repeatedly to cycle through the options.

Press the left **Enter** button to exit to the main menu.



Default: 3

#### 4.4.10. Alarm Sound:

Following the selection of the Alarm option in the Keys/Alarm Sound settings menu, the Alarm setting comprises 3 options, namely 1, 2, and 3.

Press the right **Select** button to scroll to and check the next check box. Press the right **Select** button repeatedly to cycle through the options.

Press the left **Enter** button to exit to the main menu.




Default: 3

#### 4.4.11. Information:

Following the operation procedures in 4.4, select the Information option to display the software version (V1.0).

Press the left  button to exit to the main menu.

Press the middle  button to return to the settings screen.





## **5 Specifications**

### **5.1 Sensor type: LF Magnetic Fields (MF)**

- The meter is equipped with three individual aerial sensors to measure EMFs. The overload indications can be displayed simultaneously on three axes (X, Y, Z):
- Range: 20/200/2000mG, 2/20/200 $\mu$ T.
- Resolution: 0.02/0.1/1 mG or 0.02/0.1/1  $\mu$ T.
- Frequency response: 50/60 Hz
- Sensor: Triple Axis (X, Y, Z).
- Accuracy:  $\pm(15\%+100\text{dgt})$ .



### **5.2 Sensor type: LF Electric Fields**

- Range: 50V/m to 2000V/m.
- Frequency response: 50/60Hz
- Accuracy:  $\pm(7\% + 50\text{dgt})$ .

### 5.3 Sensor type: RF Strength

- Frequency range : 50MHz to 3.5GHz.
- Accuracy:  $\pm 2\text{dB}$  at 2.45GHz
- Measurement units:  $\mu\text{W}/\text{m}^2 \sim \text{mW}/\text{m}^2$ ;  $\mu\text{W}/\text{cm}^2$ ;  $\text{mV}/\text{m} \sim \text{V}/\text{m}$ ,  $\text{mA}/\text{m}$ , and  $\text{dBm}$
- Specified measurement range: ( $0.2\mu\text{W}/\text{m}^2$  to  $554.6\text{mW}/\text{m}^2$ )  
( $0.02\mu\text{W}/\text{cm}^2$  to  $55.4\mu\text{W}/\text{cm}^2$ )( $36.1\text{mV}/\text{m}$  to  $14.46\text{V}/\text{m}$ )  
( $0.02\text{mA}/\text{m}$  to  $38.35\text{mA}/\text{m}$ )(  $-51\text{dB}$  to  $16\text{dBm}$ )
- Display resolution:  $0.2\mu\text{W}/\text{m}^2$ ,  $0.02\mu\text{W}/\text{cm}^2$ ,  $0.2\text{mV}/\text{m}$ ,  $0.02\text{mA}/\text{m}$ ,  $2\text{dB}$
- Display: 4 digits Triple LCD display.
- Sample rate: 6 seconds per time.
- Battery life: Approximate 8 hours.
- Battery: 1.5V AAA Alkaline Battery\*3.
- Audible Key tone alarm: Buzzer
- Operating temperature & humidity:  $5^\circ\text{C}$  to  $40^\circ\text{C}$ , below 80% RH.
- Storage temperature & humidity:  $-10^\circ\text{C}$  to  $60^\circ\text{C}$ , below 70%.
- Weight: About 120g.
- Dimensions: 115(L)\*60(W)\*21(H) mm.


## 6 Battery replacement

	<p style="text-align: center;"><b>WARNING</b></p> <p>If the symbol “  ” appears on the screen, please replace the battery immediately</p>
---	--

- Turn off the instrument.
- Open the battery covers and remove the battery.
- Take three new 1.5VAAA alkaline batteries, and install the batteries according to the polarity.
- Put back the battery cover.



## **7 External USB power supply:**

- External USB.
- Specifications: Voltage DC 4.8 ~ 5.2V current  $\geq$  500mA.
- A  icon is displayed when an external USB power supply is connected to the meter.
- The meter determines connected USB cables to be antennas, and thus such cables should not exceed the top rim of the buttons during testing. If the cables exceed this limit, the readings of subsequent tests are considered invalid.



## **8 Safety and maintenance standards**

- Do not operate around combustible gases or in damp environment.
- Operating altitude: below 2,000m.
- Operating environment: for indoor use, expose to pollution level II.
- This is a precision device. During use or storage, do not go beyond its spec. to prevent any possible damage or danger.
- Do not put this device in direct sunlight or where it is hot and/or damp.
- For long storage, remove the battery to prevent the battery from leaking and causing damage to the parts inside.
  - Clean the device with a dry soft cloth. The use of wet cloths, liquid and water is prohibited.

**9 End of life****Caution**

This symbol indicates that equipment and its accessories shall be subject to a separate collection and correct disposal

**TENMARS**

**Professional Electrical and  
Environment Test & Measurement  
Instruments:**

Battery Capacity/Impedance Tester,  
TACHO Meter, LED light meter, Temperature  
& Humidity meter, Infrared Thermometer,  
Sound level meter, Light meter, EMF meter,  
UV Light meter, RF meter, Hot wire  
Anemometer, CO meter, Anemometer, Lan  
cable tester, CO<sub>2</sub> meter, Solar power meter,  
Radiation meter,  
Clamp meter, Multimeter, Phase Rotation  
test, Digital Insulation tester.

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