TENMARS

TM-93
Radiation/RF Strength Meter
User's Manual

CE

HB2TM930000

Contents

TENMARS
TM-93

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- ➢ Radiation dose rate measurement. 。
- ➢ CPS/CPM : Geiger Counter count per second (CPS) or count per minute(CPM).
- ➢ RF strength measurement 。
- ➢ Languages : English; Traditional Chinese; Simplified Chinese; Japanese; Español.
- ➢ Radiation dose rate alarm setting 。
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- ➢ Radiation dose rate audible alert measurement 。
- ➢ Calibration factor 。

2 Accessories
1	Meter
1	Manual
1	9V alkaline battery
1	Carrying case

3 Safety Precaution

⚠	Caution! Please refer to this manual. Improper use may damage the meter and its components.
⚠	If the case needs to be opened, please avoid touching the board in order to prevent accidently touching the DC500V high voltage.
CE	Complies with European Directive.

- ● Do not operate in environments with flammable gas or humid environments.
- ● Operating altitude: up to 2000M.
- ● Operating environment: Indoor use; Pollution degree 2.
- ● Clean with soft cloth when dirty, such as glasses cloth. Do not clean with chemicals and other solvents.
- ● EMC: EN61326-1:CISPR 11:Group 1, Class B

✧ **Class B** – Equipment for use in all establishments other than domestic.
✧ **Group 1** – RF energy generated is needed for internal functioning.
✧ **Group 1** –RF energy generated is needed for internal functioning.
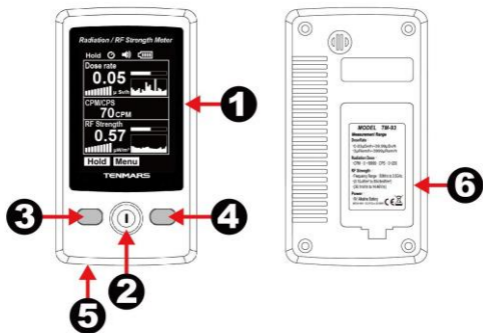
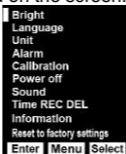# 4 Instrument Description

Fig. 2.

1. Color TFT display
2. Power button/setting button
3. Setting button
4. Setting button
5. Mini USB power supply
6. Battery Cover

5 Operation

1. Press and hold the ⓞ button for over 1 second to turn on the power; the power on screen will be displayed.
2. The power on screen will be displayed for approximately 3 seconds, and then enter the measurement screen.
3. Press the "Hold" button to turn on or turn off the data hold function. When "Hold" is displayed on the top-left of the screen, the read value is locked.
4. Press and hold the ⓞ button for over 3 seconds and the screen will be highlighted and then it will power off.

5.1 Menu setting:

Press the ⓞ button to enter or exit menu setting.
10 options are displayed on the screen:

```
Bright
Language
Unit
Alarm
Calibration
Power off
Sound
Time REC DEL
Information
Reset to factory settings
Enter  Menu  Select
```

Press the Select button to move to the function to change and then press the Enter button to enter the next stratum settings; please refer to 5.2 ~5.11.

5.2 Bright setup:

Continuing the operations from 5.1, press the Select button and move ☑ to the function to change, and then press the Enter button to save the settings and return to the measurement screen.

```
Bright
Low      ☐
Middle   ☐
High     ☑



Enter  Menu  Select
```
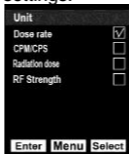Default:"High"

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5.3 Langrage Select：

Continuing the operations from 5.1, press the `Select` button and move ✅ to the function to change, and then press the `Enter` button to save the settings and return to the measurement screen.

Default: "English"

5.4 Unit Select:

1. Continuing the operations from 5.1, press the `Select` button and move ✅ to the function to change and enter the next stratum settings.

2. Press the `Select` button and move ✅ to the function to change, and then press the `Enter` button to save the settings and return to the measurement screen.
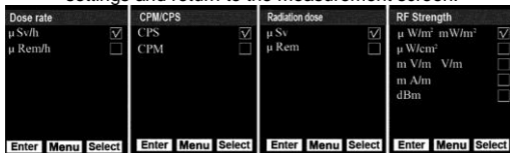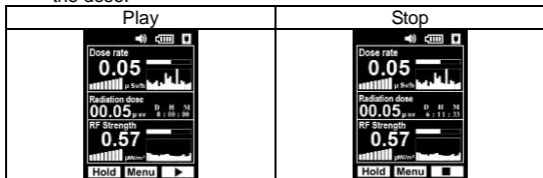

*When **Radiation dose** is selected, press the `Enter` button into 3 radiation dose measurement screen.

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3. Start The Radiation dose:

- Press the ▶ button to start the dose function; when measurement is complete, press the ⏸ button to stop the dose.

Play	Stop
Dose rate **0.05** μSv/h Radiation dose **00.05** μsv D H M 0 : 00 : 00 RF Strength **0.57** μW/m² Hold Menu ▶	Dose rate **0.05** μSv/h Radiation dose **00.05** μsv D H M 6 : 11 : 33 RF Strength **0.57** μW/m² Hold Menu ■

***Execution of the record function requires the unit to be turned on for an extended period of time, so the USB power must be used to execute this function; this function will be invalid of no external USB power function is connected!

5.5 Alarm setting:

Continuing the operations from 5.1, press the **Select** button and move √ to the function to change; once selected, press the **Enter** button to enter the next stratum settings:

- Select the radiation dose rate option; please prefer to 5.5.1
- Select the RF strength option; please refer to 5.5.2

Alarm Dose rate –hi/low √ Range 0.5-0.3 RF Strength –hi/low ☐ Range 2.0-0.1 Enter Menu Select	Alarm Dose rate –hi/low ☐ Range 0.5-0.3 RF Strength –hi/low √ Range 2.0-0.1 Enter Menu Select
● **Default**：	
0.5μsv/h (start alarm) 0.3μsv/h (green area)	2.0 V/m (start alarm) 0.1 V/m (green area)

- Radiation dose alarm adjustable range: 0.30 ~ 40.00**μ**sv/h
- RF strength adjustable range: 0.1 ~ 14.0 V/m。

5.5.1 Dose Rate Alarm Setting:

1. Continuing the operations from 5.5, press the `Enter` button to enter the next stratum enable alarm setting; select the high value or low value and then press the `Enter` button to enter the next stratum setting.
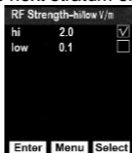

2. Press the `Select▶` button: Number cursor will move towards the right.
   Press the `Select▲` button: Numbers 0~9; the number will increase.
   Press the "`Enter`" button to save the settings and return to the measurement screen.

3. Enable alarm setting (using high value); using the measurement range as the datum, it will automatically determine whether the yellow limit has been exceeded; when the red area is reached, the alarm will go off!
   If the low value set exceeded the high value, press the `Enter` button and the high and low values will automatically be switched around and saved.

5.5.2 RF Strength Alarm Setting:

1. Continuing the operations from 5.5, press the `Enter` button to enter the next stratum enable alarm setting.

2. Press the "`Select▶`" button: Number cursor will move towards the right.

   Press the "`Select▲`" button: Numbers 0~9; the number will increase.

   Press the "`Enter`" button to save the settings and return to the measurement screen.

3. Enable alarm high limit setting; using the measurement range as the data, it will automatically determine whether the yellow limit has been exceeded and reached the red area.

   If the low value set exceeded the high value, press the "`Enter`" button and the high and low values will automatically be switched around and saved.
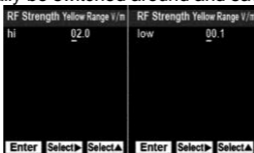
5.6 Calibration:

Continuing the operations from 5.1, press the `Select` button and move ✓ to the function to change, and then press the `Enter` button to enter the next stratum settings.

```
Calibration
Dose rate        ☑
RF Strength      ☐


Enter Menu Select
```

- Calibration factor adjustable range: 0.01~5.00.

Press the "`Select▶`" button:Cursor below the number will move towards the right.
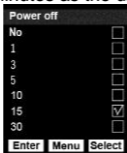Press the "`Select▲`" button: Numbers 0~9; the number will increase.
Press the "`Enter`" button to save the settings and return to the measurement screen.

```
Calibration
1.00




Enter Select▶ Select▲
```
Default:1.00

5.7 Power off:

Continuing the operations from 5.1, press the `Select` button and move ✓ to the function to change, and then press the `Enter` button to save the settings and return to the measurement screen. Uses minutes as the unit.

```
Power off
No      ☐
1       ☐
3       ☐
5       ☐
10      ☐
15      ☑
30      ☐
Enter Menu Select
```
Default:15 minute

8

5.8 Sound:
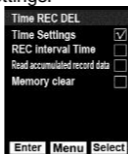
Continuing the operations from 5.1, press the Select button and move ✓ to the function to change, and then press the Enter button to save the settings and return to the measurement screen. When ◖🔊 is displayed on the measurement screen it means that sound is enabled, ◖🔊 means disabled.

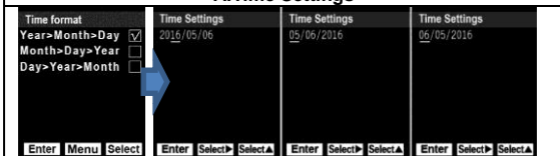| Sound	
High	☑
Middle	☐
LOW	☐
Disable	☐

Enter | Menu | Select

Default:High

5.9 Time Record Clear:

Continuing the operations from 5.1, press the Select button and move ✓ button to move to A or B or C or D, and then press the Enter button to enter settings.

Time REC DEL	
Time Settings	☑
REC interval Time	☐
Read accumulated record data	☐
Memory clear	☐

Enter | Menu | Select

A.Time Settings

Time format	Time Settings	Time Settings	Time Settings
Year>Month>Day ☑	2016/05/06	05/06/2016	06/05/2016
Month>Day>Year ☐			
Day>Year>Month ☐			
Enter Menu Select	Enter Select▶ Select▲	Enter Select▶ Select▲	Enter Select▶ Select▲

- Press the **Select** button and when ☑ moves to the time format to set, press the **Enter** button to enter time settings.
- Press the **Select▶** button; every time it is pressed, the ▬ cursor will move from left to right. When it reaches the position to set, press the **Select▲** button to increase the number until it reaches the number you need. (Holding **Select▲** will allow the number to automatically increase and cycle).
- Press the **Enter** button to save the settings and return to the measurement screen.

B.REC Interval Time

REC interval Time Day
001

Enter Select▶ Select▲

- Press the **Select▶** button; every time it is pressed, the ▬ cursor will move from left to right. When it reaches the position to set, press the **Select▲** button to increase the number until it reaches the number you need. (Holding **Select▲** will allow the number to automatically increase and cycle).
- Press the **Enter** button to save the settings and return to the measurement screen.

C. Read Accumulated Record Data

Read accumulated record data μSV	Read accumulated record data μSV
1	1 0.123
2	2 0.258
3	3 0.168
4	4 0.182
5	5 0.288
6	6
7	7
8	8
Enter Menu Select	Enter Menu Select

- Read recorded data 1~8; press the **Enter** button to return to measurement mode.

D. Memory Clear

Memory clear
DEL   ☑
Note!! Cleared records
cannot be restored!!

Enter Menu Select
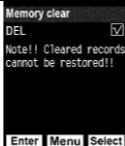
- Press **Select** and then press ☑
- Press the **Enter** button to clear the records and return to measurement mode.
- **Note!! Cleared records cannot be restored!!**

5.10 Information:

Continuing the operations from 5.1, item nine of the menu is software version: 1.2.3

● Press **Enter** and the ◎ button at the middle to return to the measurement screen.

Note!! Cleared records cannot be restored!!

5.11 Reset to factory settings:

Continuing the operations from 5.1, press the **Select** button and move **✓** to the function to change and then press the **Enter** button to save the settings and return to the measurement screen.


Note!! Cleared records cannot be restored!!

6 General Specifications

- 2.4" 240*320 resolution color TFT,4 digital maximum display 3999.
- Data hold function。
- Low battery indication：full ▮▮▮▮ empty ▮▯▯ 。
- Over load indication :OL。
- USB external power supply indicator: ⚡; automatic shutdown is cancelled and the 🔌 symbol disappears when external power is inserted.
- Radiation dose rate unit: μSv/h or μRem/h。
- Radiation dose unit:μsv or μRem。
- RF Strength unit: Wave power density (uW/m² / mW/m²), wave power density (μW/cm²), electric field strength (mV/m / V/m), magnetic field strength (mA/m),power strength (dBm) five options.
- 5 language selections: English /Traditional Chinese /Simplified Chinese /Japanese/ Español five options.
- Automatic shutdown time setting: Factory default is set to 15 minutes; users can adjust it manually to NO/1/3/5/10/15/3 minutes; NO means to cancel automatic shutdown and when "🔌" is displayed it means that automatic shutdown has been set.
- Sound volume and mute options.
- Alarm value setting.
- Radiation dose and RF strength bar graph display.
- Radiation dose and RF strength historical figure display:
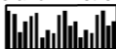
20-set display

- **Environmental status display**:

Safe zone **green** average zone **yellow** danger zone **red**

The preset color zones are for reference only: Users can adjust the yellow high and low zones.

	Dose rate Range	RF strength
The Green zone	≦0.19μ sv/h	0~0.03mW/m²;0~0.1V/m
The Yellow zone	0.2~0.5μ sv/h	0.1~2.0 V/m
The Red zone	>0.51μsv/h	≧2.1V/m

- Battery Life ： Approximately 10 hours.
- Power : 9V Alkaline battery（NEDA 1604、IEC 6F22 or JIS 006P).。
- Operation temperature and humidity: 5 to 40°C(41 to 104°F); under 80%RH.
- Storage temperature and humidity: -10 to 60°C (14 to 140°F); under 70% RH.
- Dimensions:115x60x31mm(length x width x height).
- Weight: Approximately 170 grams.
- External power supply:
  - ➢ DC4.8~5.2V current≧500mA.
  - ➢ 🔌 will be displayed on the screen when external USB power is supplied.
  - ➢ The inserted USB cable is also viewed as an antenna; do not let the USB cable exceed the top of the button when performing tests. If RF strength test is performed when it exceeds the top of the button, the value read is invalid.

7 Electrical Specifications
Accuracy is indicated at 23°C ± 5°C with RH < 80%.
7.1 Radiation Dose Rate and Dose

Sample rate	1 time/10 seconds or 1 time/40 seconds
Radiation sensor	geiger-mueller tube
Measurement Range	0.05µSv/h~39.99µSv/h 5.00µRem/h~3999µRem
Resolution	0.01µSv/h 0.01µRem/h
Accuracy	±15% Cesium-137
Gamma energy range	10KeV to 1.25 MeV
X-rays energy range	3KeV to 3.0 MeV
β-beta energy range	25KeV to 3.5 MeV
CPM	0~1999
CPS	0~212
Dose logger interval	1 to 999 days

7.2 RF Strength

Sample rate	1 times/10 seconds
RF sensor	Single axis sensor
Measurement Range	0.1 ~ 14.0 V/m
Accuracy	±2dB at 2.45GHz
Frequency Range	50MHz to 3.5GHz
Range	(0.02uW/m² to 484.6uW/m²) (0.01uW/cm² to 45.3uW/cm²) (36.1mV/m to13.90V/m) (0.01mA/m to 30.01mA/m) (-46dBm to 16dBm)
Resolution	0.01µW/m²,0.01µW/cm²,0.2mV/m,0.02mA/m, 2dB

8 Maintenance or Repair

1. When the When ⚁ symbol is displayed on the LCD, it means that there is insufficient power; please change the battery immediately in order to ensure its accuracy.
2. Do not place the meter in locations that have high temperature, humidity or that are exposed to direct sunlight.
3. Remember to turn off the power after usage; remove the battery if not used for a long period of time in order to prevent battery leakage and causing damages to internal components.

When the instrument failure, only by the authorized service provider or return the original repair.

9 Battery Replacement

1. Turn off the power.
2. Open the battery cover at the back of the meter, remove the battery.
3. Please insert a new 9V battery according to the polarities.
4. Put the battery cover back in place.

10 Product Disposal

Note: This symbol indicates that the meter and its accessories must be separated and processed properly.

TENMARS $\langle$VFE$\rangle$

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 mete r ,Hot wire Anemometer ,CO meter ,Anemometer ,Lan cable tester ,CO_2 meter ,Solar power meter ,Radiation meter, Clamp meter ,Multimeter ,Phase Rotation test, Digital Insulation tester.

Our products of high quality are selling well all over the world