TENMARS

ST-109R
Integrating Sound Level Meter
User's Manual

UNDER   OVER
SET8 88:88:88 REC FULL MEM
RT60 TIME
HOLD Fast Slow Impulse   SD USB
Peak   SEC
INST   dBA
SEL   114.0   dBC
SPL   dBZ
Leq
MAX 1888 dBA dBC dBZ   MIN 1888 dBA dBC dBZ

F/S/I   SET
FUNC   REC MEM

(€
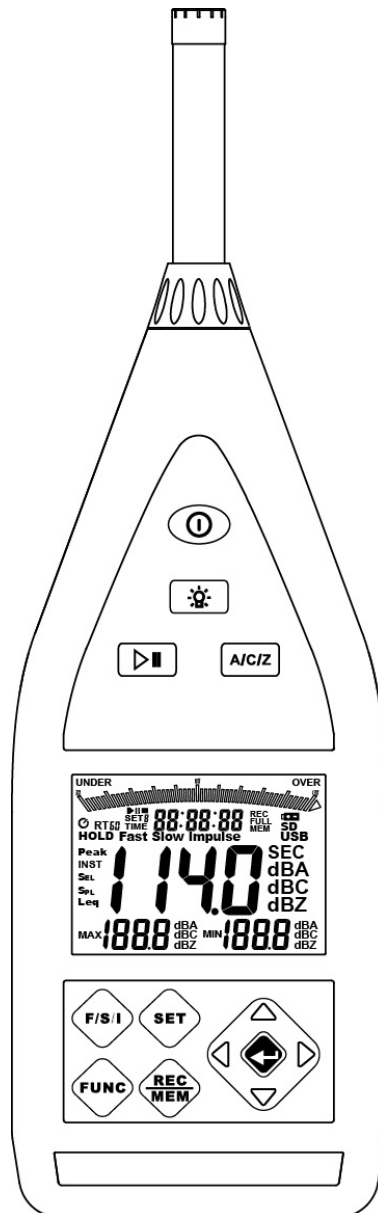
HB2ST109R004

Contents

1 Introduction

This Integrating Sound Level Meter (ISLM) is   IEC61672-1:2002 Class 1 compliant.

2 Accessories

1   Meter
1   User's Manual
1   AC to DC adaptor
1   Windscreen ball
1   USB cable (Mini B type)
1   AC adapter (9~12V/500mA)
4   1.5V AA-LR6-AM3 alkaline battery

3 Safety Precaution

⚠	Caution! Please refer to this manual. Improper use may damage the meter ad its components.
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.
✧ **Group1** – RF energy generated is needed for internal functioning.

4 Instrument Description

1. Microphone	11. Clock switch/left arrow button
2. Power Button	12. OK button
3. Backlight Button	13. Clock switch/right arrow button
4. Start or Pause Test Button	14. Shift switch/end measurement/down arrow button
5. Frequency Weighting Select Button	15. MICRO SD card slot
6. Time Weighting Select Button	16. Analog/RS232 professional output
7. Set Button	
8. Test function select button	17. USB
9. Record dada / Reading Record dada button	18. DC voltage input (6V~12V)
10. Data Hold/ up arrow button.	

5 Operation

1. Press ⓞ button to power on or off your product.
2. Press (FUNC) button to selection measurement mode.
- Sound pressure level (SPL)
- Equivalent Energy Sound Level (Leq)
- Sound exposure level (SEL)
- Peak sound pressure (PeakMAX)
3. Press (F/S/I) button to switch time weight.
4. Press [A/C/Z] button to switch frequency weight.
5. Press ▼ button to switch shift, end integrating measurement during integrating.
6. Press [▶Ⅱ] button to start integrating measuring (SPL exclusive) and revoke auto off function.
7. Display measurement readings on LCD.
∗ Peak sound pressure (PeakMAX) does not support time and frequency weighting.

⚠	**CAUTION**
	Please mount windscreen to microphone as shown in figure below to reduce wind noise when ambient wind speed is greater than 10m/sec.
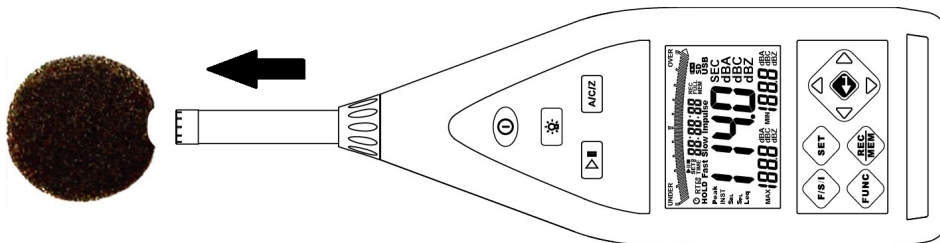
5.1 Backlight Button

In standby mode，Press ☼ button to turn on backlight, press ☼ button again to turn it off immediately.

＊Backlight will turn off in 15 seconds automatically.

5.2 Start/Pause Measuring

Press ▶❚ button to start integrating Leq/SEL/PeakMAX and MAX/MIN lock-up function with the maximum and minimum values displayed at the lower row of LCD and measurement interval upper row of LCD. Press ▶❚ button to pause measurement and ▼ button to abort measurement.

＊The longest time that the SPL mode, SEL, and peak sound pressure mode can last is 99 hours, 59 minutes and 59 seconds.

5.3 Data Hold:

Press ▲ button to the on/off data HOLD. If the integrating is started, this function is invalid.

5.4 Single Record/ Datalogger Reading

Each press the REC/MEM button once to display REC message, increment record count by 1 and log one measurement record.

Press and hold REC/MEM button for 1 second to enter record reading mode, press ▲/▼ button to reading records, press ◀▶ button to toggle switch time display between hh:mm:ss and yyyy/mm/dd, press and hold REC/MEM button for 1 second to exit reading function.

5.5 Product Setup

Press ⟨SET⟩ button to enter set-up mode of this product for the following:

Press the button to cycle through the following options:

Clock → Auto record → Auto power off → Communication interface → Delete one record → Delete all record → Copy SD card → 94dB calibrate → Back to measurement mode

⟨SET⟩ Select settings

◀/▶ Select place settings

▲/▼ Select value up/down

⟨REC MEM⟩ Enter data delete/copy

↩ Enter setup and exit setup page

＊Please get your SD card installed before enabling SD card copy function. Please refer to section 5.9 for details.

5.6 Integrating Time Setup

In Leg mode the record and integrating time settings are the same:

Press ⟨SET⟩ button to enter Integrating time selection page, the LCD display REC with the following options for selection:

10 seconds → 1 minute → 5 minute → 10 minute → 30 minute → 1 hour → 8 hour → 16 hour → 1 day → Custom. Press ◀/▶ button to point cursors, ▲ /▼ button to change values, with the maximum settings at 23 hours, 59 minutes and 59 seconds.

◈ Enter setup and exit setup page.

5.7 Auto Power Off

The longest auto power off time is 99 minutes; set this to zero to disable the auto off function.

The auto power off will be disabled accordingly in the USB connection mode.

5.8 Analog/Communication Output Interface

This product features to computer communication inter-face: USB and RS-232.

The RS-232 (TTL) and analog output inter-face shares.

You may select USB or RS232 inter-face in the set-up mode. The default value is USB.

AC signal output: MAX: 5VP-P/130dB, output impedance around 600Ω

DC signal output: 10mV/10dB, output impedance around 100Ω
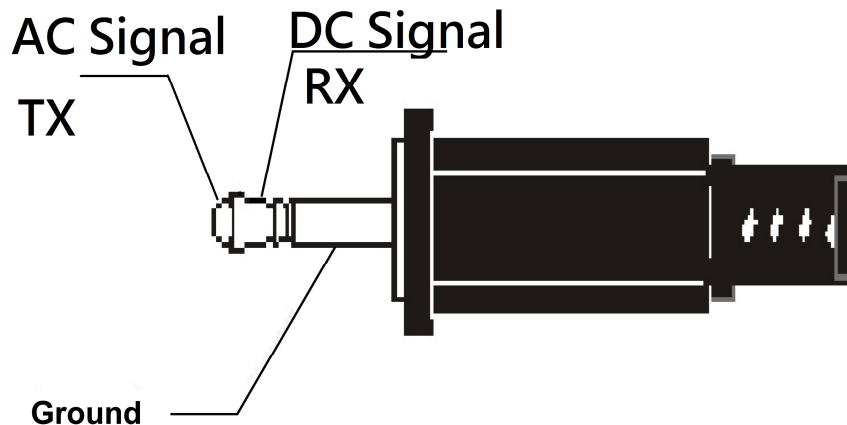
5.9 Record Data Delete/Back-up

You may define the file name with a desktop program: file extension is "*.IAR", file name may contain up to 8 characters including capital letter A~F and number 0~9.

The auto backup function copies data from this product to micro SD card and delete them afterwards.

Please connect to external power source for micro SD card write-in operation to prevent it from failed due to power outage.

You may manually delete records in the mode of a single record or all records.

The single record delete function erases the latest one first and move to the earlies one.

See section 5.5 for the functions of individual buttons.

＊ID of this product is "FFFFFFFF" by default.

＊This product supports a micro SD card in the FAT16/FAT32 format.

＊The maximum space supported in SD/SDHC mode is 32GB.

5.10 94dB Calibrate

94dB Source

Input 94dB@1KHZ signal.

Last calibration records are displayed at the lower right corner of LCD.

Current measurement value is displayed at the lower left corner of LCD.

Time weight value is Fast by default.
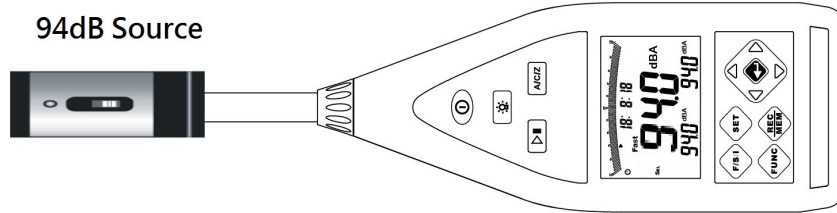
Calibration range: 91dB~97dB.

Press [A/C/Z] button to the selection frequency weight.

Press ▼ button to select shift.

Press [▶❚❚] button to select full calibration.

Press (SET) button to select next setup mode.

Press ⬧ button to save calibration value and exit set-up mode.

5.11 Microphone Connection Inter-face

Pin 1: signal input

Pin 2: ground

Pin 3: power supply

Pin 4: X
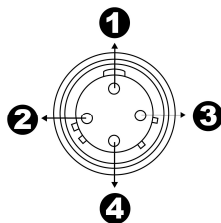
5.12 Microphone Extension Test

To avoid measurement deviation due to the reflection effect and invalid operations you may measure integrating sound levels by extending the microphone with an extension cord.

● Press ⊙ button to power off this product.

● Turn the pre-amplifier and microphone counterclockwise to remove them from the body as shown in figure below:
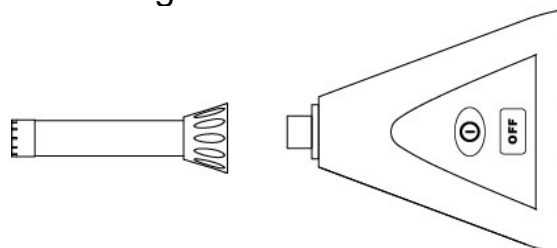
● Connect extension cord to the pre-amplifier and microphone as shown in the figure below:
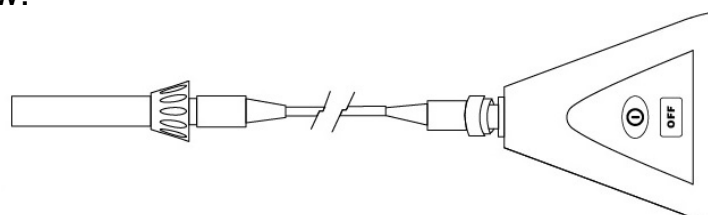
5.13   Equivalent Free-Field

Frequency	Deviation pressure
20-400	0
500	0
630	0
800	0
1000	0.2
1250	0.3
1600	0.4
2000	0.5
2500	0.6
3150	0.7
4000	0.9
5000	1.5
6300	2.3
8000	3.5
10000	5
12500	6.5
16000	8.7
20000	10.3

* Microphone specification: ST-109

6 Software Installation

1. Link website https://www.tenmars.com/
2. Search ST-109R.
3. Click on the ST-109R photo.
4. Click File Download, then select Software Download.
5. Download and unzip the software. For the latest software information and installation procedures, please refer to the software installation guide.
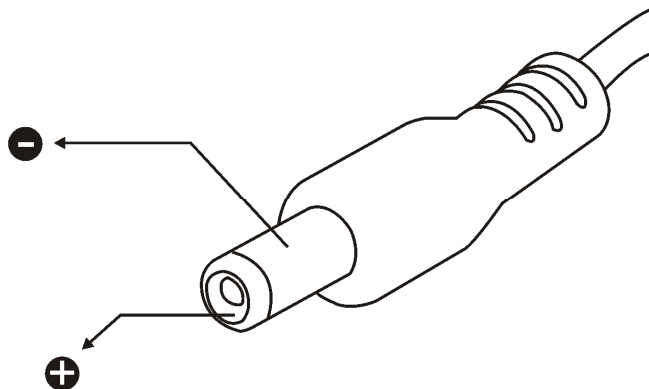
7 General Specifications

- **Readings display:** two rows with maximum value at 1999.
- Lower power detection, backlight function, data lock function (HOLD)
- Auto power On/Off function
- **Overload display:** "OVER" or "UNDER"
- **Storage interval:** 1 second~ 24 hours; up to 35,000 records.
- **Battery:** 1.5V*4(LR6 – AA – AM3 – MN 1500)
- **Battery life:** Approximately 30 hours
- **Power consumption at standby mode:** 10uW
- **Power consumption at operation mode:** 250mW
- **Operation temperature and humidity:** 5℃~40℃ with relative humidity up to 80%
- **Storage temperature and humidity:** -10℃~60℃ with relative humidity up to 70%
- **Weight:** Approximately 500 grams
- **Dimensions:** 285(L)x90(W)x39(H) mm
- **Adapter specification:**

Convert external AC 100~240V power to DC 9V/0.5A

Specification: Voltage at DC9V/0.5A

Plug: O.D.: 5.5mm; I.D.: 2.1mm

8 Electrical specification

| Display Refresh Rate	One time per second
Major Applicable Standards	IEC 61672-1：2002 Class1 IEC60651:1979 TYPE 1 IEC60804:2000 TYPE 1
Microphone	High sensitivity, 1/2" pre-polarized capacitor microphone 50 mV/Pa
Measurement Items	Lxyp,Lxmax,Lxmin,Lxeq,LAE,Lcpeak
Measurement Range	30dB ~ 130dB (A) 35dB ~ 130dB (C) 40dB ~ 130dB (Z)
Dynamic range	60 dB
Measurement shift	30dB ~ 90dB (L) 50dB ~ 110dB (M) 70dB ~ 130dB (H)
Integrate Time Setup	Manual, 10s, 1m, 5m, 10m , 30m, 1h, 8h, 16h, 24h
Micro SD Card	The max support capacity of micro SD card is 32GB；37,000 data about story space 300KB
Peak value measurement range	70~133 dBC
Time Weighting	Fast, Slow, Impulse, Peak
Frequency Weighting	A/C/Z
Frequency Range	20Hz~16KHz
DC Output	10mV/1dB
AC Output	1Vrms(±10%)/130dB each range
Starting Time	＜10 Second
Thermal noise	≦28dBA

● Ps: Lxyp➔ x= A/C/Z,y=F/S/I

9 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.
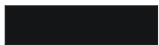
10 Battery Replacement
1. Turn off the power.
2. Open the battery cover at the back of the meter, remove the batteries.
3. Insert four batteries in the correct positive-negative polarity.
4. Put the battery cover back in place.
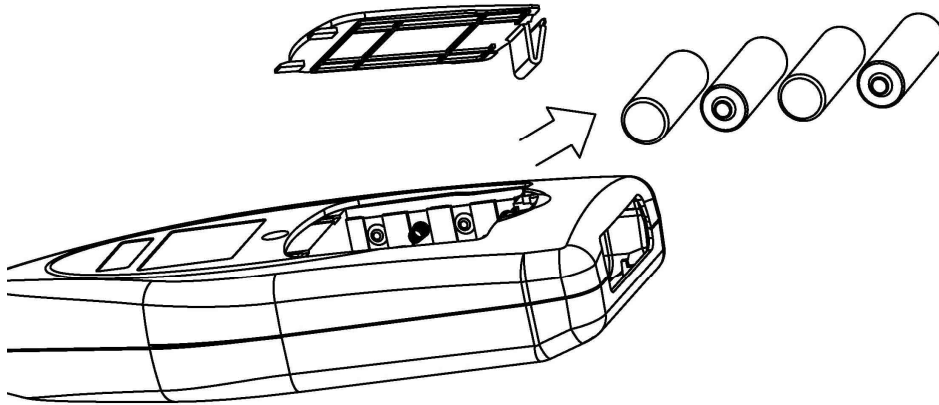
11 Product Disposal
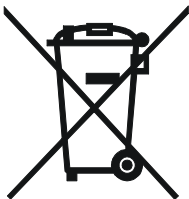
Note: This symbol indicates that the meter and its accessories must be separated and processed properly.