



# **ZX3100**

## **Sound Level Analyzer**

### **User Manual**



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## Health and Safety Consideration

This apparatus has been designed and tested in accordance with IEC/EN 61010 – 1. This manual contains information and warnings that must be followed to ensure safe operation and to retain the apparatus in a safe condition.

## Safety Usage Consideration

When using the ZX3300 Sound Level Analyzer, it is crucial to adhere to safety guidelines to prevent fire hazards or personal injury. Ensure that you fully read and understand the safety notice before use. Always operate the device only for its intended purpose and refrain from unauthorized disassembly, as tampering may lead to malfunctions or unsafe conditions. If the device begins to overheat or show signs of malfunction, immediately cease operation to avoid potential risks. For any required repairs, always contact ZXONIC rather than attempting fixes yourself. Additionally, keep the device away from heat sources, open flames, or high-temperature areas to ensure safe and optimal acoustic performance.

Revision History

Revision	Description	Revision Date
V 1.0	Initial Release	July 2025

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## 1. Overview

The ZXONIC ZX3100 Sound Level Meter is a modular and versatile device with an RF field sensitivity classified as X-type. It adopts advanced digital detection technology, significantly improving the instrument's stability and reliability. The ZX3100 features a wide dynamic range, easy operation, and versatile applications. The casing is made of ABS+PC engineering plastic, giving it an attractive appearance, lightweight design, and portability. Powered by batteries with low power consumption, the instrument features large-capacity storage, recording capabilities, and USB flash drive functionality. It is widely applicable in environmental protection, occupational health, industrial enterprises, and scientific research and education. It can be used for environmental noise measurement, occupational health noise measurement, machine equipment noise measurement, and more.

## 2. Key Features

- 1) 115 dB ultra-wide dynamic range — No need to switch measurement ranges;
- 2) Frequency weighting and time weighting — Fully implemented using digital signal processing technology;
- 3) 2.4-inch color display — Easy to operate, capable of measuring and displaying multiple indicators simultaneously.
- 4) 4 GB internal storage — Secure storage of measurement results, with expandable TF card storage up to 64 GB.
- 5) Powerful functionality — Supports overall integration and statistical integration modes;
- 6) High-precision recording — Recorded data can be exported to a computer for spectrum analysis or playback.

### 3. Key Performance Indicators

#### 3.1 Basic Performance Indicators (Total Value Integration)

- 1) Microphone combination
  - a) ZX1025 measurement microphone paired with ZX1901 preamplifier.
    - i) Standard sensitivity level: -28 dB.
  - b) Note 1: The reference of sensitivity is 0 dB at 1 V/Pa. Unless otherwise specified, all indicators refer to the standard sensitivity level.
  - c) Note 2: Factory sensitivity is controlled between -28.0 dB and -28.9 dB, and the measurement range of the instrument will vary based on sensitivity level changes.
- 2) Frequency Range: 10 Hz - 20 kHz.
- 3) Measurement range of SPL (Sound Pressure Level) at 1000 Hz
  - a) A-weighted sound level: 25 dB - 140 dB.
  - b) C-weighted sound level: 30 dB - 140 dB.
  - c) Z-weighted sound level: 35 dB - 140 dB.
  - d) C-weighted peak sound level: 60 dB - 143 dB.
- 4) Measurement range of SPL (Sound Pressure Level) at other frequencies
  - a) 31.5 Hz: 25 dB - 100 dB (A).
  - b) 4 kHz: 25 dB - 141 dB (A).
  - c) 8 kHz: 25 dB - 139 dB (A).
  - d) 12.5 kHz: 25 dB - 135 dB (A).
- 5) Internal Electrical Noise
  - a) Less than 13 dB(A).
  - b) less than 18 dB(C).
  - c) less than 23 dB(Z).
- 6) A/D Resolution: 24 bits.
- 7) Sampling Frequency: 48 kHz.
- 8) Accuracy Level: Class 1.
- 9) Detector Characteristics: True RMS (Root Mean Square) digital detection.
- 10) Time Weighting: Parallel (simultaneous) F, S, I, I10.
- 11) Frequency Weighting: Parallel A, C, Z — Free-field response is in Appendix A.
- 12) Compliance Standards: IEC 61672-1:2013 Class 1.
- 13) Display: 2.4-inch color display, with a resolution of 240 × 320.
- 14) Measurement Modes
  - a) Total value integration.
  - b) Statistics integration.
- 15) Measurement Indicators: Lxyp, Lxeq,T, Lxeq,t, Lxymax, Lxymin, LxE, Lxpeak, E, SD.
  - a) Note: x represents A, C, Z; y represents F, S, I, I10.
- 16) Data Storage: 4 GB internal storage, with up to 64 GB TF card.
- 17) Output Interfaces: AC, DC, IO expansion port, USB port.
- 18) Power Supply: 4 LR6 alkaline batteries, 5 V/1 A external power supply.
- 19) Measurement Time: Configurable from 1 second to 99 hours.



- 20) Operating Temperature Range: -20°C to 60°C.
- 21) Relative Humidity: 20% to 90%.
- 22) Air Pressure: 65 kPa to- 108 kPa.
- 23) Dimensions (mm): 76 × 33 × 250.
- 24) Weight: Approximately 340 g.
- 25) Measurement Range (1 kHz) when other microphones are selected:

Microphone Model	Preamplifier Model	Standard Sensitivity Level
ZX1025	ZX1901	- 48 dB
Measurement Range	Peak Measurement Range	Frequency Range
45 dB - 160 dB	80 dB - 163 dB	10 Hz - 20 kHz

### 3.2 Other Features

- 1) TF Card with Large Capacity Storage
  - a) Measurement results are saved on the TF card in text file format. These files can be opened directly using PC Notepad software (externally modified files will not be recognized by the instrument when re-imported).
  - b) When connected to a computer via USB, go to the “Memory” module in the “Settings” menu, and set “Switch to USB mode” to “Yes”. The instrument will then convert the TF card to a USB drive.
- 2) Audio Recording Capabilities
  - a) File types: options include WAV and MP3.
  - b) Sampling frequencies: options include 12 kHz, 24 kHz, and 48 kHz.
  - c) Resolution: options include 16-bit and 24-bit (MP3 format supports 16-bit only).
  - d) Recording duration: until memory is full (in continuous recording mode, audio recording files will be split into one-hour segments).
  - e) Playback: Recordings can be played back on the instrument or on a PC.








### 3.3 Optional Functions

#### Statistical integration function

- 1) Statistical distribution and cumulative distribution of noise.
- 2) Can select from frequency weighting and time weighting.
- 3) In addition to standard indicators such as L5, L10, L50, L90, and L95, users can define additional cumulative percentage sound level indicators.

### 3.4 Definitions of Symbols and Abbreviations

Ts	Preset integration measurement time
Tm	Actual elapsed measurement time
Tl	Remaining measurement time
F	Time weighting in Fast mode, with time constant of 125 ms
S	Time weighting in Slow mode, with time constant of 1000 ms
I	Time weighting in Impulse mode, with time constant of 35 ms
I10	Time weighting in Impulse mode, rising edge time constant of 10 ms
LA <sub>Fp</sub>	Maximum A-weighted sound level in Fast mode within 0.5 s
LA <sub>Sp</sub>	Maximum A-weighted sound level in Slow mode within 0.5 s
LA <sub>I<sub>p</sub></sub>	Maximum A-weighted sound level in Impulse mode within 0.5 s
LA <sub>I10p</sub>	Maximum A-weighted sound level in I10 mode within 0.5 s
LC <sub>Fp</sub>	Maximum C-weighted sound level in Fast mode within 0.5 s
LC <sub>Sp</sub>	Maximum C-weighted sound level in Slow mode within 0.5 s
LC <sub>I<sub>p</sub></sub>	Maximum C-weighted sound level in Impulse mode within 0.5 s
LC <sub>I10p</sub>	Maximum C-weighted sound level in I10 mode within 0.5 s
LZ <sub>Fp</sub>	Maximum Z-weighted sound level in Fast mode within 0.5 s
LZ <sub>Sp</sub>	Maximum Z-weighted sound level in Slow mode within 0.5 s
LZ <sub>I<sub>p</sub></sub>	Maximum Z-weighted sound level in Impulse mode within 0.5 s
LZ <sub>I10p</sub>	Maximum Z-weighted sound level in I10 mode within 0.5 s
LA <sub>eq,t</sub>	A-weighted equivalent sound level for a 1-second period
LC <sub>eq,t</sub>	C-weighted equivalent sound level for a 1-second period
LZ <sub>eq,t</sub>	Z-weighted equivalent sound level for a 1-second period
L <sub>max</sub>	Maximum sound pressure level under set frequency weighting and time weighting
L <sub>min</sub>	Minimum sound pressure level under set frequency weighting and time weighting
LA <sub>eq,T</sub>	A-weighted equivalent sound level over the set period T
LC <sub>eq,T</sub>	C-weighted equivalent sound level over the set period T
LZ <sub>eq,T</sub>	Z-weighted equivalent sound level over the set period T
Delay	In manual start mode, the waiting time after pressing the start button before entering integration measurement
Delayed Startup	In triggered recording mode, the waiting time after the preset threshold is exceeded before recording starts
LA <sub>peak</sub>	A-weighted peak sound level
LC <sub>peak</sub>	C-weighted peak sound level
LZ <sub>peak</sub>	Z-weighted peak sound level
LA <sub>E</sub>	A-weighted sound exposure level = $LA_{eq,T} + 10 * \log(T)$
LC <sub>E</sub>	C-weighted sound exposure level = $LC_{eq,T} + 10 * \log(T)$

LZE	Z-weighted sound exposure level = $L_{Zeq,T} + 10 \cdot \log(T)$
E	Personal sound exposure, in units of $\text{Pa}^2 \cdot \text{h}$
L5	5% of sound pressure levels exceed this value
L10	10% of sound pressure levels exceed this value
L50	50% of sound pressure levels exceed this value
L90	90% of sound pressure levels exceed this value
L95	95% of sound pressure levels exceed this value
SD	Root mean square deviation
LAFi	Instantaneous A-weighted sound level in Fast mode
LASi	Instantaneous A-weighted sound level in Slow mode
LAli	Instantaneous A-weighted sound level in Impulse mode
LCFi	Instantaneous C-weighted sound level in Fast mode
LCSi	Instantaneous C-weighted sound level in Slow mode
LCIi	Instantaneous C-weighted sound level in Impulse mode
LZFi	Instantaneous Z-weighted sound level in Fast mode
LZSi	Instantaneous Z-weighted sound level in Slow mode
LZIi	Instantaneous Z-weighted sound level in Impulse mode
	Battery level display
	External power supply connection
	Low battery
	Under-range
	Audio Recording
	TF card storage
	Bluetooth

## 4. Structural Features

### 4.1 Structure

The appearance of the instrument is shown in Figure 4.1. It consists of a measurement microphone, a preamplifier, and a host. The preamplifier is mounted on the instrument, and during normal operation, the measurement microphone should be installed on the preamplifier. The microphone can be detached from the sound level meter by rotating the knurled nut. The effect of using an extension cable on measurement results is discussed in Appendix E. The top of the sound level meter is pointed to minimize sound wave reflections. Its directional characteristics under different incident angles are described in Appendix B. The outer casing is made of ABS+PC via injection molding, and the nominal reflective effects caused by the casing are described in Appendix D. The instrument uses four LR6 alkaline batteries placed in the battery compartment, and the battery cover can be removed for direct replacement of batteries. The display is a 2.4-inch color screen with a resolution of 240x320. An overload indicator is located on the upper front panel, while a power indicator light is at the bottom of the instrument and will flash once every 2 seconds once the instrument is turned on. The power button must be held for 1 second to turn the instrument on or off (a shutdown prompt will appear before turning off).



Figure 4.1

The front-end interface of the instrument is an X9 socket used to connect the preamplifier. The pin layout of the socket is shown in Figure 4.2, and the interfaces at the bottom of the instrument are shown in Figure 4.3.

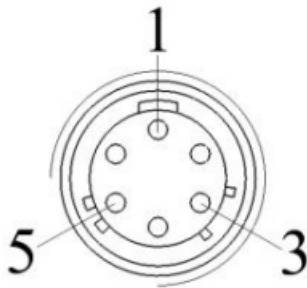


Figure 4.2

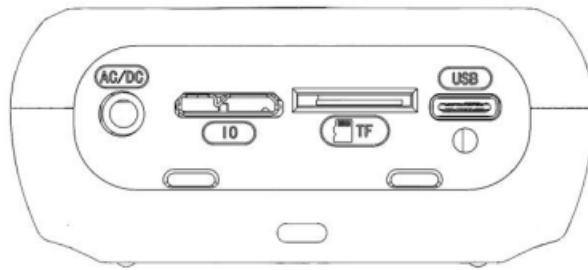


Figure 4.3

- 1) USB: This port can be connected to a 5 V, 1 A external power supply to power the instrument. When connected to a computer, the instrument can function as a USB drive.
- 2) IO: When the port is connected via a serial conversion cable, it supports RS232 data communication. When connected to a computer, it can transmit measurement data in real time. When connected to a mini printer, it can print out measurement results and related charts.
- 3) AC/DC: This socket uses a stereo output jack. When used with a compatible plug. The AC output amplitude has two adjustable levels, differing by a factor of 100. When the amplitude is set to "6.86 mV/Pa", it means that when a 1 Pa sound pressure is applied to the measurement microphone, an AC signal of approximately 6.86 mV can be output at the AC output pin. When set to "686 mV/Pa", the output amplitude under the same sound pressure is increased. However, at higher sound pressure levels, the AC output may become distorted. DC output ratio: 20 mV/dB. For example, at 100 dB, the output voltage is 2 V, and the maximum output voltage is 3.1 V.

Note: The reference sensitivity level is -28 dB.

<b>AC Output Amplitude</b>	6.86 mV/Pa	686 mV/Pa
<b>Maximum Un-distorted Output Sound Pressure</b>	100 Pa	1 Pa

- 4) TF Card: The instrument supports TF card expansion, with a maximum capacity of 64 GB. To insert a TF Card method face the metal contact side up.
- 5) Interface Description
  - a) USB Port: As shown in Figure 4.4, the USB port has 24 pins, labeled A01 to A12 and B01 to B12. The table below describes the pin assignments, where A and B correspond to the upper and lower rows, respectively:

<b>A01</b>	GND (Ground)	<b>B12</b>	GND (Ground)
<b>A02</b>	/	<b>B11</b>	/
<b>A03</b>	/	<b>B10</b>	/
<b>A04</b>	VBUS (Power line)	<b>B09</b>	VBUS (Power line)
<b>A05</b>	/	<b>B08</b>	/
<b>A06</b>	USB D+	<b>B07</b>	USB D-
<b>A07</b>	USB D-	<b>B06</b>	USB D+
<b>A08</b>	/	<b>B05</b>	/
<b>A09</b>	VBUS (Power line)	<b>B04</b>	VBUS (Power line)
<b>A10</b>	/	<b>B03</b>	/
<b>A11</b>	/	<b>B02</b>	/
<b>A12</b>	GND (Ground)	<b>B01</b>	GND (Ground)
Note: “/” indicates that the pin does not have a specific function.			

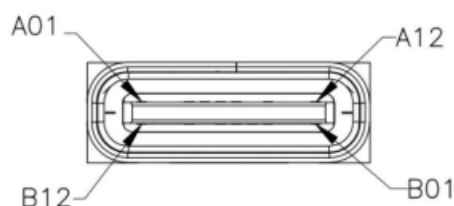


Figure 4.4



Figure 4.5

- b) IO Serial Port: The pins of the IO serial port of the instrument are shown in Figure 4.5. The following table provides a description of the five main pins.

<b>1</b>	Serial Port Receive
<b>2</b>	Serial Port Transmit
<b>3</b>	Power-On Line: When the serial cable is connected to the instrument's IO port, the instrument powers on automatically
<b>4</b>	GND (Ground)
<b>5</b>	VCC (Power cord)

## 4.2 Keys

Figure 4.6 shows the front panel of the instrument, which contains 10 keys, including Power key, Backlight key, Start/Pause key, Return key, Delete/End key, Cursor key, Parameter key, and OK key.



- 1) Power Key: Short press to power on/off.
- 2) Backlight Key: Manually toggles the backlight.
- 3) Start/Pause Key: Starts or pauses a measurement.
- 4) Return Key: Returns to the previous screen.
- 5) Delete/End Key: Deletes records or ends a measurement.
- 6) Cursor Key: Used to move the on-screen cursor.
- 7) Parameter Key: Selects adjustable options on screen.
- 8) OK Key: Confirms selection or enters the next menu.

Note: These are the main functions of the keys. Functions may vary depending on the current interface and application context.



## 5. Preparations

### 5.1 Use Preparation

- 1) Ensure the measurement microphone and preamplifier are correctly installed.
- 2) Check if batteries are installed. If not, open the battery cover on the back of the sound level meter and insert the batteries with correct polarity.
- 3) Before measurement, use a sound calibrator to calibrate the instrument. (See Section 6.3 for calibration instructions.)
- 4) The sound level meter should be calibrated annually by an authorized parties to ensure accuracy.

### 5.2 Use of Windshield

When measuring in windy environments, a windshield can be used to reduce wind noise. Different windshields may be used. For example, the S80 windshield can reduce wind noise by approximately 10-15 dB (with horizontal placement and wind speed at 5 m/s, A-weighting). After the sound level meter is equipped with a windshield, its free-field characteristics without wind are described in Appendix C.

### 5.3 External Power Supply

A USB port is located at the bottom of the sound level meter and can be used to connect an external power supply. The external power supply voltage range is DC 5 V to DC 5.5 V. When using the instrument for extended periods, it is recommended to use an external power supply. If both batteries and an external power source are connected, the instrument will prioritize using the external power supply.

### 5.4 Battery Check and Replacement

The instrument uses 4 AA alkaline batteries. While in operation, the instrument automatically checks battery levels. If the power is low, a low battery indicator will appear to prompt replacement. To replace the batteries, remove the cover and old batteries, insert new ones with correct polarity, close the cover, and the instrument will be ready to use.



## 6. Operation Instructions

### 6.1 Power On



Figure 6.1

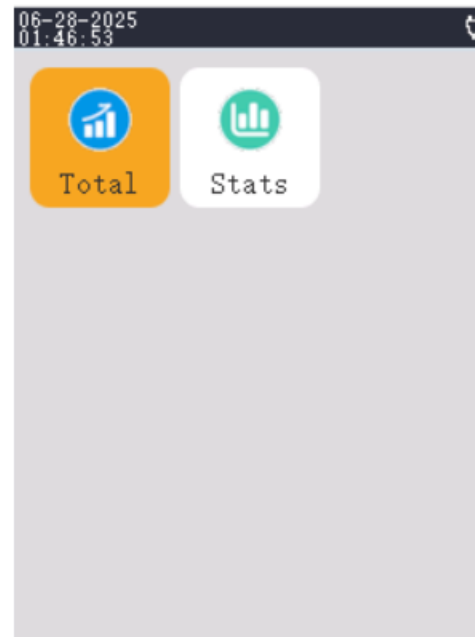


Figure 6.2

When the instrument is off, press the Power key to start the system. During startup, the instrument performs a self-test. If successful, it will display "Self-Test completed". After self-test, the main menu appears with the following sub-menus: "Measurement," "Calibration," "Review," and "Settings" (see Figure 6.1). Use the Cursor key to select "Measurement," then press the OK key to enter the noise measurement interface. Two measurement modules will be displayed: Total Value Integration and Statistical Integration (see Figure 6.2).

## 6.2 Noise Measurement

### 6.2.1 Total Value Integration Interface

#### 6.2.1.1 Total Value Integration — Simple Interface

From the noise measurement main screen, use the cursor key to select “Total,” then press the OK key to enter the Total Value Integration interface. The default view is the Simple Interface, as shown in Figure 6.3.



Figure 6.3

- 1) Status Bar: Displays time, under-range status, TF card status, recording status, battery status, etc. The specific status indicators shown will depend on the current configuration.
- 2) Navigation Area:
  - a. Measurement Mode: Default is the "Total" option selected from the main interface "Measure", and is highlighted.
  - b. Display Mode: Default is "Simp." (Simple). Use the cursor key to select it, and press the Parameter key to toggle between "Graph" and "List" views.
- 3) Measurement Area:

The measurement area displays various parameters such as  $L_{xyp}$ ,  $L_{xeq,t}$ ,  $L_{xymax}$ ,  $L_{xymin}$ ,  $L_{xeq,T}$ ,  $L_{xpeak}$ ,  $L_{xE}$ , and  $L_{xymax}$  dynamic graphs, instantaneous measurement values, integration values, and Max Hold Function. By default, it displays instantaneous values, with the graph ranging from 0 dB to 200 dB. Time and frequency weighting can be selected via the Weighting key, with default set to A/F.

The user can toggle between instantaneous, integrated, and max-hold values using the Parameter key. When switched to integrated values ( $L_{xymax}$ ,  $L_{xymin}$ ,  $L_{xeq,T}$ ,  $L_{xpeak}$ ,  $L_{xE}$ ), if integration has not started, parameters show as "---" (Figure 6.4).

Once integration starts, the integration parameter updates every 0.5 seconds (Figure 6.5).

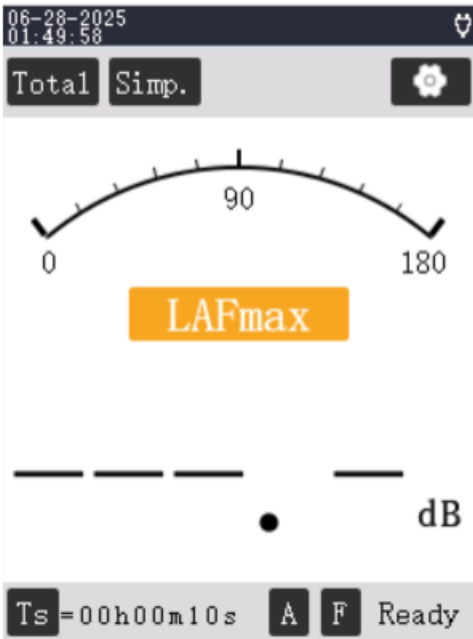


Figure 6.4



Figure 6.5

When switched to Lxymax. (Max Hold) (Figure 6.7), the maximum value updates only when a higher sound pressure level is detected. If sound pressure level remains below the current Lxymax., the max value can be manually updated by pressing the OK key. When switched back to instantaneous values (Lxyp/Lxeq,t), updates occur every 0.5 seconds.

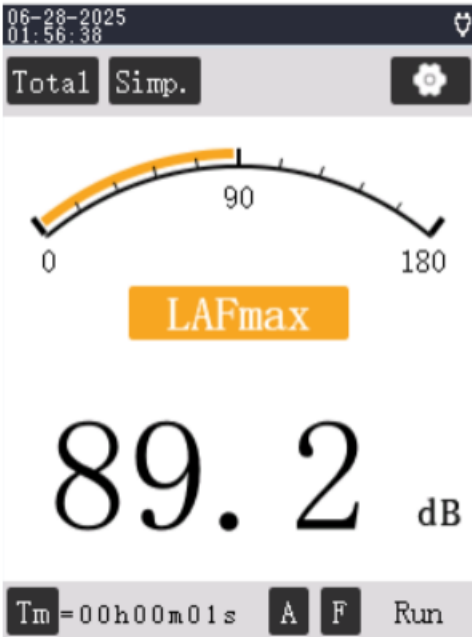


Figure 6.6

## 4) Status Prompt Area:

- a. Measurement Status: Initial state is "Ready." Press the "Start/Pause" key to change the status to "Measuring." Pressing again changes to "Paused." Once the measurement is complete, the status will change to "Finished" (see Figure 6.7).
- b.

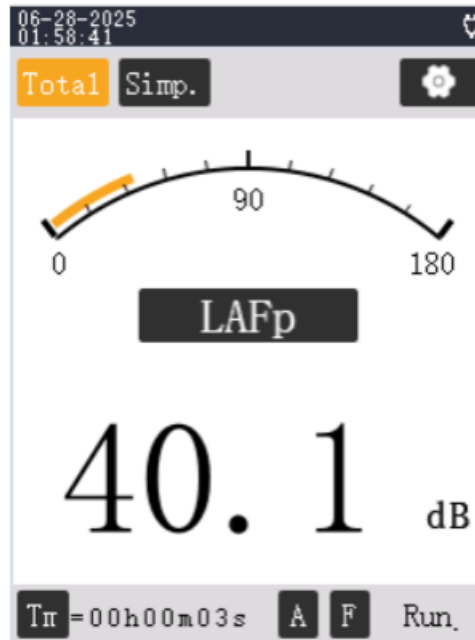


Figure 6.7

- c. Integration Time Display: Default is  $T_s$  (as set in Total Value Integration settings). When status is Measuring/Paused/Finished, it shows  $T_m$  (measurement duration). Select  $T_s$  with the cursor key and press the Parameter key to toggle to  $T_l$  (remaining time), where  $T_l = T_s - T_m$ .
- d. Weighting Options: Default is A/F. Use the cursor key to select frequency weighting, then press the Parameter key to toggle between A, C, Z. Select time weighting to switch between F, S, I, I10.

## 5) Measurement Settings Area:

Use the cursor key to select "Settings" and press the OK key to enter the Settings interface of Total Value Integration. You can configure  $T_s$ , Trigger Mode, Delay, etc. (see section 6.2.1.4 for details). A message "Measuring, please confirm again!" will pop up when selecting the Settings icon and pressing the OK key. Pressing the OK key stops measurement, saves data, and opens the settings page. Pressing Delete/End stops measurement without saving and opens the settings page. Pressing Return cancels the operation and returns to the current screen.

### 6.2.1.2 Total Value Integration — Graph Interface

In the Simple Interface of Total Value Integration, press the cursor key to select “Simple”, and then press the parameter key to switch to the graph interface, as shown in Figure 6.8. This interface plots the current parameter values. If you switch to another parameter, it draws the new sound pressure level curve over the existing one.

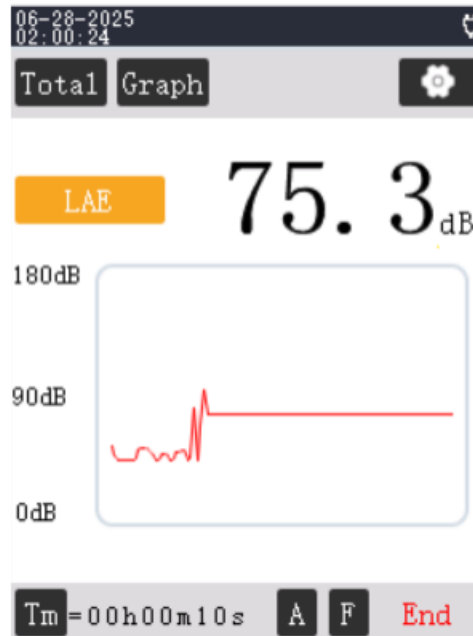


Figure 6.8

- 1) Indicator Selection: Use the cursor key to select the parameter. Press the Parameter key to switch.
- 2) Y-axis: The sound pressure level range is 0.0 dB to 150.0 dB.
- 3) X-axis: Each data point represents one sampling point.
- 4) Instantaneous SPL does not support page flipping.
- 5) The graph begins updating immediately when the interface is entered.

### 6.2.1.3 Total Value Integration — List Interface

From the Simple Interface, press the cursor to select “Graph”, and then press the parameter key to switch to the list interface, as shown in Figure 6.9.

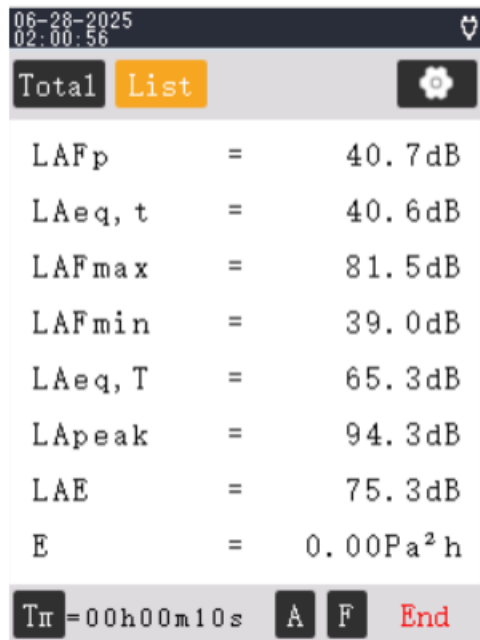


Figure 6.9

In this interface, the measurement area will display the total value integration measurement results, with the following measurement indicators: LxyP, LXeq,t, Lxymax, Lxymin, LXeq,T, LXpeak, LXE, and E.

6.2.1.4 Total Value Integration — Settings Interface

Use the cursor key to select “Settings”, then press the OK key to enter the settings interface (see Figure 6.10).



Figure 6.10

Note: You cannot enter the settings menu while measurement is in progress.

- 1) Ts Setting: Default: 10 seconds. Use the cursor key to move between hours, minutes, and seconds, and the Parameter key to adjust the time between 1 second and 99 hours 59 minutes 59 seconds. When the cursor is on Ts, pressing the Parameter key also allows selection from preset values: 10 s, 1 m, 5 m, 10 m, 15 m, 20 m, 30 m, 1 h, 2 h, 4 h, 8 h, 24 h.
- 2) Trigger Mode Setting: The options include "Key", "Over-limit", "Timed", "Equal-Interval". The default is "Key". Additional options will be displayed in accordance with the chosen mode.
  - a. When "Trigger Mode" is switched to the option "Key", press the "Start/Pause" key to start the measurement. Delay can be set using the Parameter key between 0-99 seconds.
  - b. When "Trigger Mode" is switched to the option "Overrun", the measurement automatically starts when the measured value exceeds a preset threshold.
    - a) Indicators: Options include LAFp, LAsp, LAIp, LCFp, LCSp, LCIp, LZFP, LZSp, LZIp.
    - b) Threshold: The default is 100 dB. Adjustable from 10 dB to 180 dB.

Note: For over-limit and timed integration modes that require continuous operation, a 1-second delay may occur between consecutive measurements due to hardware limitations.
  - c. When "Trigger Mode" is switched to the option "Timing", the cursor can be moved to year, month, day, hour, minute, and second for "Start time", and press the parameter key to adjust these values. When a field is set to its maximum value, "\*\*\*" will be displayed (please note that seconds cannot be set to "\*\*\*"). When setting "\*\*\*", it must be set from the left to the right. For example, if you need to set it to start on the 1st day of each month, you must set both the year and month to "\*\*\*", and then change the date to 01. "\*\*\*" means that when the timing starts, this item does not participate in the comparison, so that it can be started every hour, every day, and every month. Users can set a time here, and the instrument will automatically start when the calendar clock reaches this time. For example, \*\*/\*\*/0108h00m00s means that the measurement starts at 8 AM on the 1st of each month; \*\*/\*\*/\*\* 08h00m00s means that the measurement starts at 8 AM every day.
  - d. When "Trigger Mode" is switched to the option "EQ INR", click "Start" for the first measurement, which starts at the next full minute, then repeats every  $\Delta T$ .  
 $\Delta T$  options: 10 s, 30 s, 1 min, 2 min, 5 min, 10 min, 20 min, 30 min, 1 h. For example, selecting 1 min means the measurement will start at the beginning of each minute, while 5 min means the measurement will start at every 5-minute interval (i.e. the clock is "\*\*:\*0:00" or "\*\*:\*5:00").
    - i. Note: When the measurement time Ts is set to be greater than this interval, the actual measurement time of the instrument is Ts, and the actual start interval is extended. For example, if the interval time is set to 5 minutes and Ts is set to 6 minutes, the instrument will start measuring when the



clock reaches 5 minutes for the first time. If the clock is 08:00:00, the measurement result will be saved after 6 minutes of measurement, and the measurement will be started again when the clock is 08:10:00, that is, the start interval has been extended to 10 minutes.

#### 6.2.1.5 Trigger Integration

Upon entering the Total Value Integration page, the default status is "Ready". All indicators except  $L_p$  and  $Leq,t$  display either "---" or the previous measurement value. After setting the measurement time, Trigger Mode, frequency weighting, time weighting, audio recording and other parameters according to the standards or as needed, press the "Start/Pause" key to begin measurement. The status will become "Measuring", and all measurement indicators begin calculating. When the measurement time  $T_m$  reaches the preset time  $T_s$ , the integration measurement will stop, and the displayed indicators, except  $L_p$  and  $Leq,t$ , will stop changing and be automatically saved. The saved data can be reviewed via the "Data" option in the main interface.

If wishing to pause the measurement during the process, you can press the "Start/Pause" key. The instrument's status will change to "Pause". In this state, the instantaneous values will still change with the measured noise, but the other measurement data will stop refreshing. If wishing to stop the measurement and save the current results, you can press the Return key for a prompt "Run" to pop up, and then press the OK key to stop and save the data before returning to the previous screen. Press the "Delete/End" key for the pop-up prompt "Run", then press the OK key to stop and save the data, and the measurement status changes to "End". If you want to continue the measurement, you can press the "Start/Pause" key again. After the measurement ends, the status changes to "End".

When the "Start" key is pressed, the system needs to perform checks based on the settings, as follows:

- 1)  $T_s$  Check: When starting the measurement, the system will calculate the corresponding integration values based on the actual integration time.
- 2) Trigger Mode Check:
  - a. When "Trigger Mode" is switched to the option "Key", pressing "Start" will trigger the system to check the delay duration. If "Delay Duration > 0", the system will count down the delay before starting the measurement.
  - b. When "Trigger Mode" is switched to "Overrun", manual start is not allowed. Only when the value of the indicator exceeds the Overrun does the measurement start automatically. The system will not perform any further checks during the measurement time  $T_s$ . After one measurement session ends, the system will recheck the conditions. If the environmental noise level is constantly above the Overrun threshold, the system will continue testing without returning to the previous interface. In this case, move the cursor to the Setting icon in the upper right corner, press OK, and adjust the Overrun threshold or Trigger Mode.
  - c. When "Trigger Mode" is switched to "Timing", manual start is not available. The system will automatically start at the set time according to the timing rules.
  - d. When "Trigger Mode" is switched to "EQ INR", Click "Start", then the system will



start the first measurement when the clock reaches the next whole minute and then measure at intervals of  $\Delta T$ .

3) Recording Check:

- a. If recording is enabled in the “Recording Set” of the “Setting” interface, and “Trigger Mode” is switched to the option “Overrun”, recording will be triggered when the instantaneous value exceeds the limit. The recording duration will be the “Recording Duration” set in the settings, and the recording file will be saved in the corresponding folder.
  - b. If “Trigger Mode” is switched to the option “Synchronous”, recording will start automatically when the measurement starts, and the recording file will be saved in the corresponding folder.
- 4) Digital Recorder Check: When the measurement is started, the system will check if the digital recorder is activated. If it is, it will save the corresponding values based on the selected indicators.

#### 6.2.1.6 Overload Indicator

If measured noise exceeds the instrument’s range, the overload indicator on the front panel lights up. The duration of the overload indication matches the duration of the overload condition, with a minimum of 1 second. The overload detection is based on evaluating the peak value of the signal. When the signal has a large crest factor, the instrument may still experience overload even if the displayed sound pressure level is below the upper measurement limit.

### 6.2.2 Statistics Integration

#### 6.2.2.1 Statistical Integration List Interface

From the Noise Measurement screen, use the cursor key to select “Sta” (Statistics Integration) then press the OK key. Or use the Parameter key to switch to Statistical Integration from the Total Integration Interface.

The status bar, navigation area, measurement area, status prompt area, and settings area behave the same as in the Total Integration Interface. The measurement area displays the statistics integration measurement values. The measurement indicators are LXYp, LXeq,T, LXYmax, LXYmin, L5, L10, L50, L90, L95, LE, SD.

The procedures for starting, pausing, and stopping are the same as in total value integration. Use the cursor to select Settings, press the OK key to enter the Statistical Integration Settings page, where Ts, Trigger Mode, Ln1 to Ln5, etc, can be set. (Note: Settings cannot be changed during measurement.)

The default weighting settings is A/F (A-weighted, with Fast time-weighting). The frequency weighting can be chosen between A, C, Z, and the time-weighting can be chosen between F, S, I.

#### 6.2.2.2 Statistical Integration Graph Interface

When “List” is selected, press the Parameter key to switch to the graph interface of

statistical distribution (SD), as shown in Figure 6.11. This graph shows the distribution of sound pressure levels during the measurement.

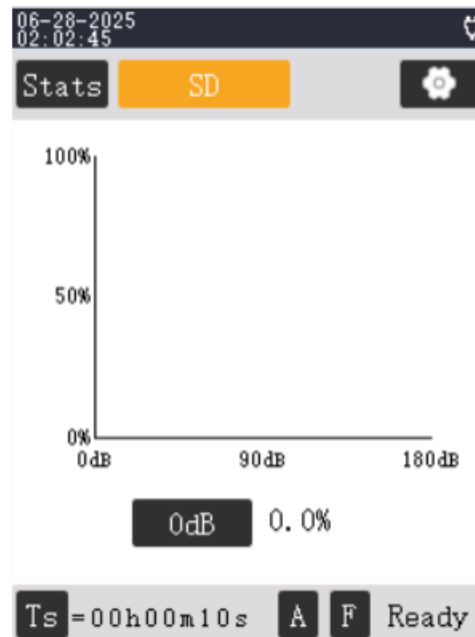


Figure 6.11

Use the Parameter key “+/-” to adjust sound pressure level in 1 dB increments. The data to the right of the sound pressure level is the percentage of each sound pressure level during the measurement period, calculated based on the selected frequency weighting, time weighting, and Tm in the statistics integration measurement for viewing.

In the statistical integration interface, selecting “Statistical Distribution” and pressing the parameter key switches to the cumulative distribution graph interface, as shown in Figure 6.12. The cumulative distribution graph calculates and displays the cumulative percentage distribution of sound pressure levels. For example, L5 = 70.4 dB means that during the integration measurement period, 5% of the sound pressure levels exceeded 70.4 dB; L90 = 51.8 dB means that 90% of the sound pressure levels exceeded 51.8 dB.

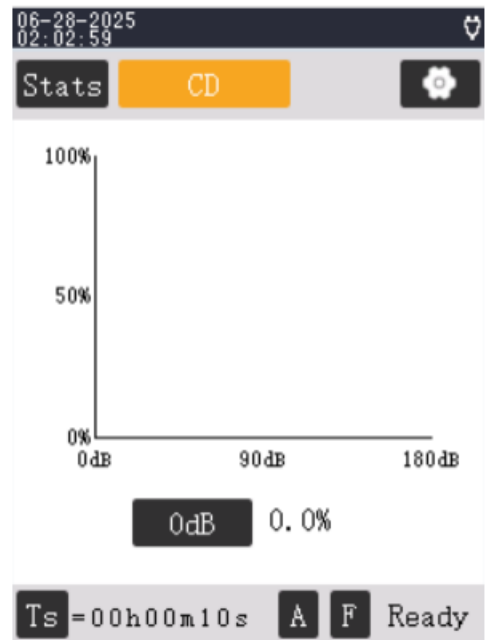


Figure 6.12

For both graphs, the Y-axis represents percentages (0.0% to 100.0%), and the X-axis represents sound pressure level (0.0 dB to 180.0 dB).

6.2.2.3 Statistical Integration Settings Interface

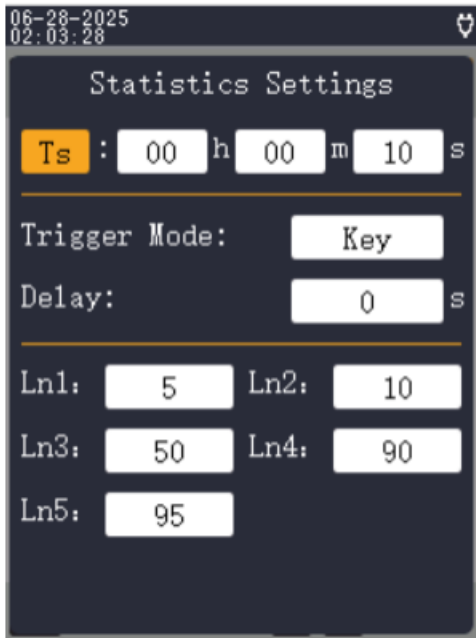


Figure 6.13

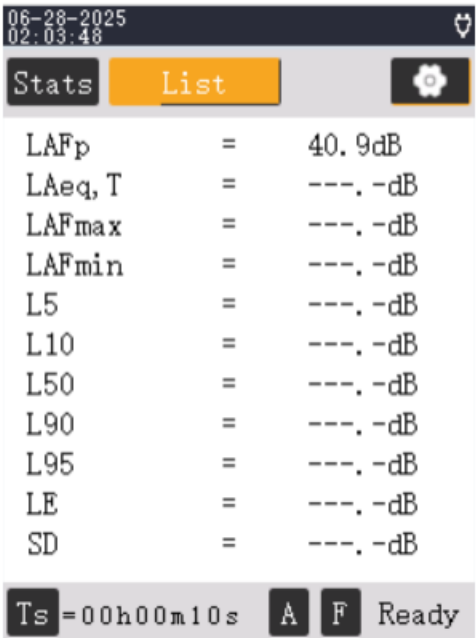


Figure 6.14

Use the cursor key to select "Settings", and press the OK key to enter the Statistical Integration Settings interface (see Figure 6.14). Ts and Start Mode settings are the same as in Total Value Integration. The default values for Ln1, Ln2, Ln3, Ln4, and Ln5 are "5, 10, 50,

90, 95". Press the cursor key to select the parameter value that you want to set, and press the parameter key to increase or decrease it by 1 each time.

The additional indicators range from 1 to 99, corresponding to L1 to L99, and these additional indicators cannot be duplicated. After the settings are saved, the additional indicators will be displayed in the statistics integration list, as shown in Figure 6.16. For example, L5 = 70.4 dB means that 5% of SPL values exceeded 70.4 dB during the measurement. L90 = 51.8 dB means that 90% of SPL values exceeded 51.8 dB.

## 6.3 Calibration

### 6.3.1 Sound Calibration Interface



Figure 6.15

From the main menu, use the cursor key to select "Calibration," then press the OK key to enter the Sound Calibration interface (Figure 6.15).

- 1) Lp: Read-only, shows current environmental sound pressure level. Default unit is dBC; press the Parameter key to switch between dBA and dBC.
- 2) New SL (New Sensitivity Level): The sensitivity level saved from the last calibration. Unit: dB (0 dB = 1 V/Pa; -28.0 dB = 39.8 mV/Pa). Automatically recalculated during calibration.
- 3) Measurement Range: When sensitivity is between -28.0 and -28.9 dB, the range is 25 dB to 140 dB. The upper and lower limits vary depending on the microphone's sensitivity level.
- 4) Calibration: Default state is "Ready." Press Start/Pause to begin a 10-second countdown. If the new sensitivity is within  $\pm 3$  dB of the last saved sensitivity level, calibration succeeds. Otherwise, it fails.

Note: The instrument has been calibrated before leaving the factory. The displayed values represent the factory calibration or the last calibration stored during previous use. Factory calibration data is shown by default. Before use, recalibration is recommended using a Class 1 Sound Calibrator per GB/T 15173 or IEC 60942.

### 6.3.2 Calibration Settings

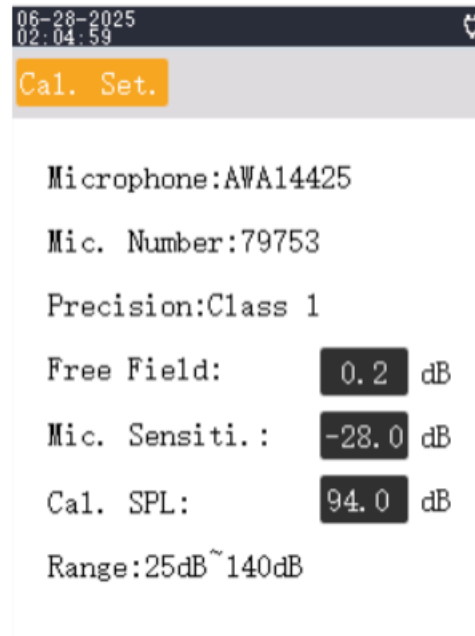


Figure 6.16

In the sound calibration interface, use the cursor key to select "Calibration," then press the Parameter key to switch to the Calibration Settings interface (Figure 6.16).

- 1) Microphone Model: Read-only, default: AWA14425.
- 2) Microphone Serial Number: Editable by manufacturer authorization.
- 3) Precision: Indicates the instrument's precision.
- 4) Free-Field Correction: Press the cursor key to select the free field correction value, then use the Parameter key to set between 0.0 dB and 1.0 dB.
- 5) Microphone Sensitivity Level: Default is -28.0 dB. Adjustable in 0.1 dB steps between -80.0 dB and -10.0 dB using the Parameter key.
- 6) Calibrator sound pressure level: Default is 94.0 dB. Adjustable in 0.1 dB steps between 70.0 dB and 130.0 dB using the Parameter key.
- 7) Measurement Range: After modifying the microphone sensitivity level and microphone type, press the OK key. The upper and lower limits of the range will change accordingly.

### 6.3.3 Calibration Records

From the Calibration Settings screen, use the cursor key to select "Calibration Settings," then press the Parameter key to access Calibration Records (Figure 6.17), where the historical records of calibration can be viewed.



Figure 6.17

- 1) List Order: Sorted in reverse chronological order.
- 2) Page Navigation: Use cursor key to select < or > and OK key to turn pages.
- 3) Delete All: Press Delete, then Confirm twice to delete all records.
- 4) Calibration Details: Select a record and press the OK key. Displays calibration time, microphone model/serial, accuracy, correction, sensitivity, calibrator SPL, range, and Lp.
- 5) Delete One Record: In the details view, press Delete, then Confirm twice to delete that record.

### 6.3.4 Performing Calibration with a Calibrator

The calibration interface is shown in Figure 6.218. To perform calibration, place the sound calibrator onto the measurement microphone and turn on the calibrator. Wait a few seconds until the output stabilizes (the stabilization time may vary depending on the calibrator; refer to actual performance), and then press the "Start/Pause" key to begin calibration. A 10-second countdown will appear, indicating the calibration is in progress. The current sound pressure level displayed represents the sound produced by the calibrator acting on the measurement microphone. The final displayed value should equal the calibrator's sound pressure level (94.0 dB) minus the free-field correction factor (0.20 dB), resulting in 93.8 dB. As shown in Figure 6.18, the screen should display Lp = 93.8 dBC. Once the countdown ends, the button changes to indicate calibration success (or failure). Press the OK key to save the calibration record and return the system to the "Ready" state. If calibration fails, the record

cannot be saved, and subsequent measurements and calibrations will continue from the previously saved sensitivity level.

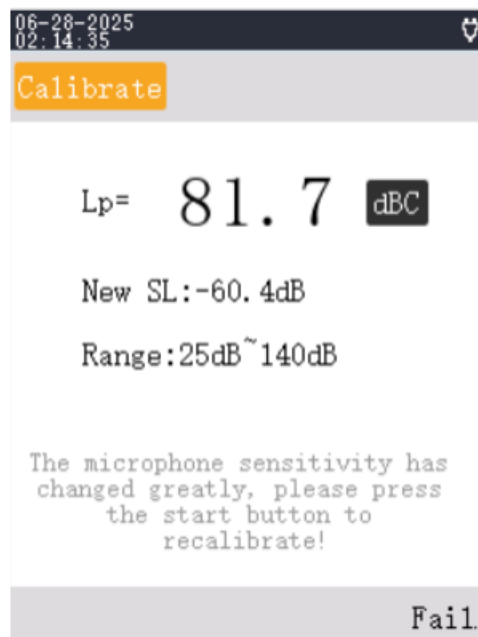


Figure 6.18



Figure 6.19

If the newly calibrated sensitivity differs from the previously saved value by no more than 3 dB, calibration is considered successful, as shown in Figure 6.18. Press the "OK" key to save the result and return to the "Ready" state. Alternatively, press the "Back" key to discard the current calibration result and return to the "Ready" state. If the sensitivity difference exceeds 3 dB, calibration fails, as shown in Figure 6.19. In this case, press either the "Back" or "OK" key to return to the "Ready" state.

If calibration fails, users should check whether the calibrator is properly mounted on the microphone and powered on. Also, verify that the measurement microphone has not sustained any visible damage. If calibration still cannot be completed successfully, please contact customer support.

If a new microphone with a significantly different sensitivity is being used, it is necessary to manually set the new sensitivity value in the calibration settings interface. In the calibration settings menu, move the cursor to the "Microphone Sensitivity" field, use the parameter key to adjust the value manually, and press the "OK" key to save it. Once saved, return to the sound calibration interface and perform calibration again. If the system still displays the message "Microphone sensitivity change too large, please press start to re-calibrate," repeat the manual adjustment process until successful calibration is achieved. If repeated adjustments still fail, please contact customer support.



6.4 Data Access

6.4.1 Data Access Interface

From the main menu, select “Data” and press the OK key to enter the data access interface (Figure 6.20). The measurement record list is sorted by the reverse order of measurement time.

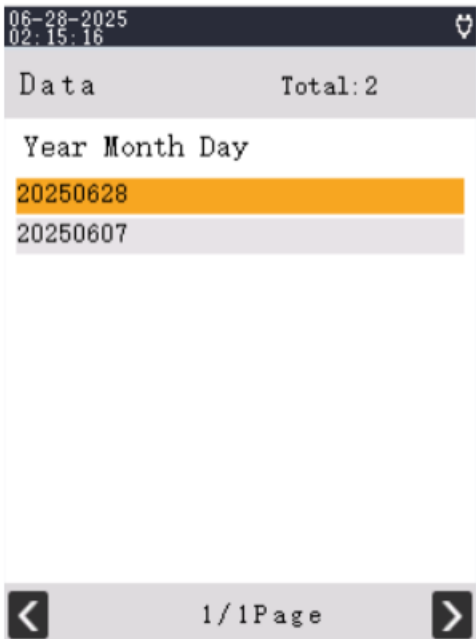


Figure 6.20

- 1) List Sorting: Reverse chronological order.
- 2) Page Navigation: Use cursor key to select < or >, press the OK key to turn pages.
- 3) Delete a Group: Select a record and press Delete. Confirm twice to delete (Figure 6.21 and Figure 6.22).

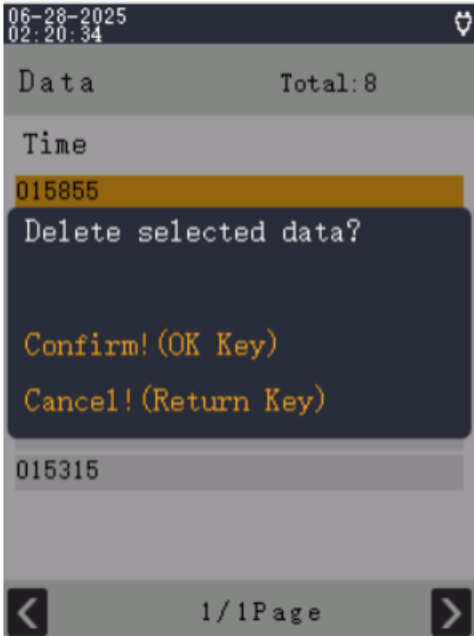


Figure 6.21

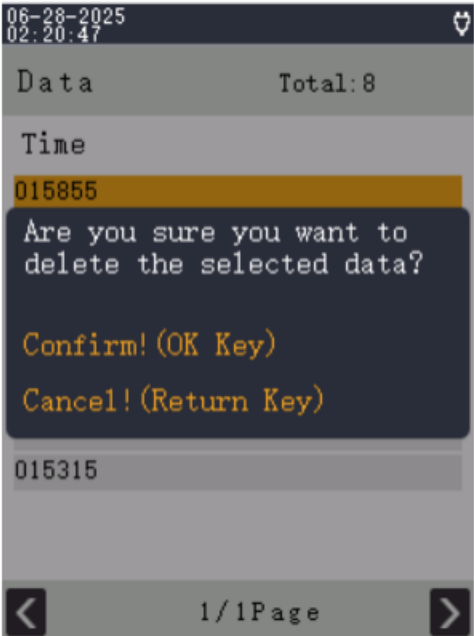


Figure 6.22



- 4) Delete One Record: In the details view, press Delete. Confirm twice to delete the selected entry (Figure 6.23 and Figure 6.24).

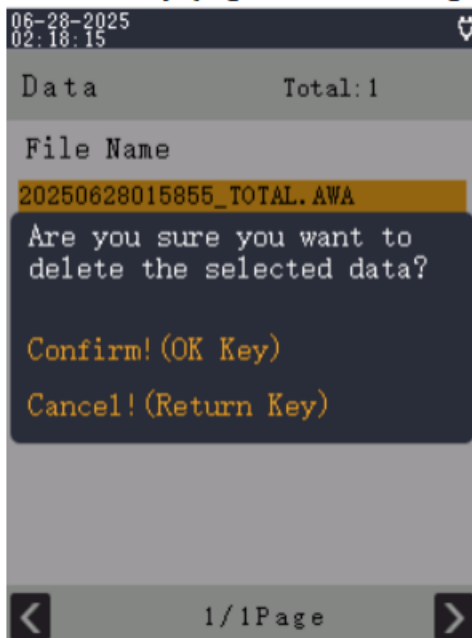


Figure 6.23

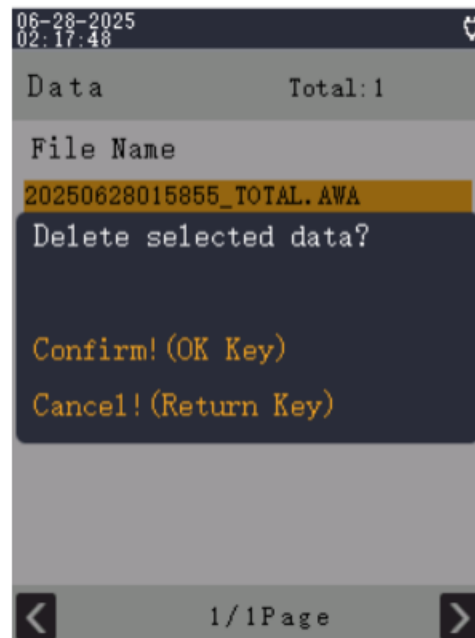


Figure 6.24

- 5) Delete Multiple Records: In the details view, use Start/Pause to select multiple entries. Press Delete, then Confirm twice.

### 6.4.2 Integration History Details

Enter the time folder and select a .AWA file using the cursor key. Press the OK key to view integration history (Figure 6.25):

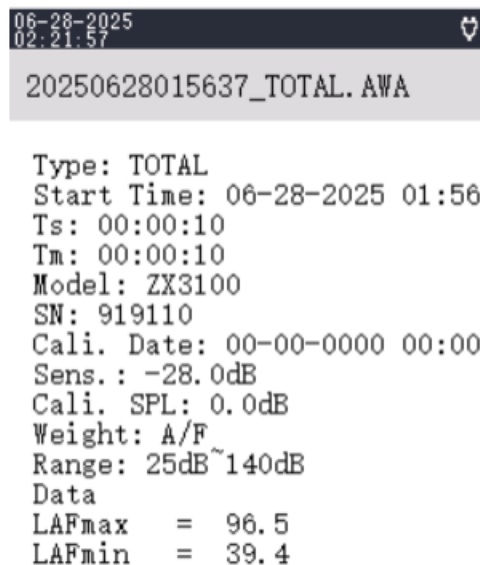


Figure 6.25

- 1) Measurement Info: Method, start time, Ts, Tm, model, serial number, calibration time, sensitivity, calibrator sound pressure level, range.
- 2) Indicators: Same as those in the measurement interface. Use the Parameter key to navigate between pages.

### 6.4.3 Digital Record Details

Enter the date folder, select the DRE.AWA file using the cursor key, and press the OK key to access the digital record details interface (see Figure 6.26).

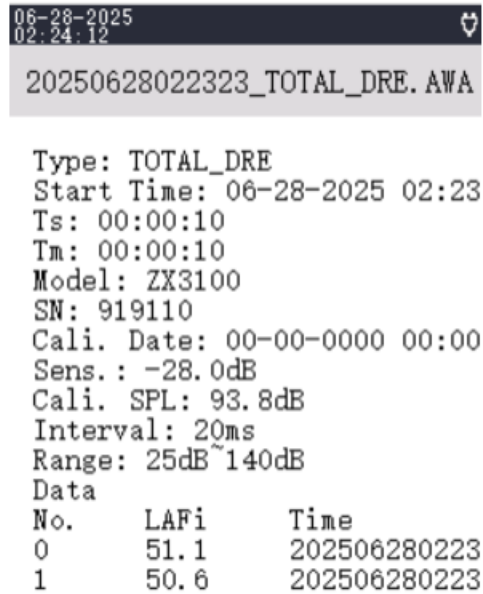


Figure 6.26

- 1) Measurement Info: Includes method, start time, Ts, Tm, model, serial number, calibration time, sensitivity, calibrator sound pressure level, sampling interval, and measurement range.
- 2) Listed Indicators: Match the settings configured under Settings > Digital Record. Use the Parameter key to navigate between pages.

#### 6.4.4 Recording Files

Within the date folder, select a WAV or MP3 file using the cursor key, then press the OK key to play the recording (Figure 6.27).

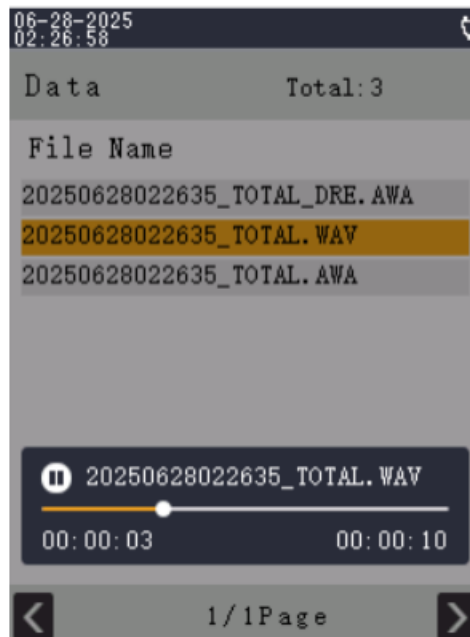


Figure 6.27

Insert the monitoring headphones into the AC output port located at the bottom of the instrument. Locate the target audio file and press the OK key to begin playback. Note that only the left audio channel is used for playback. You can control the playback progress using the left cursor key to fast forward or the right cursor key to rewind, each press skipping 10 seconds. If you rewind past the beginning, playback will restart from 0 seconds. If you fast forward past the end of the file, playback will stop automatically.

Note: Due to hardware limitations, audio files recorded at a 12 kHz sampling frequency cannot be played on the device.

6.5 Settings

6.5.1 Interface Overview

From the main menu, select "Settings" using the cursor key and press the OK key to enter the settings menu (see Figure 6.28).

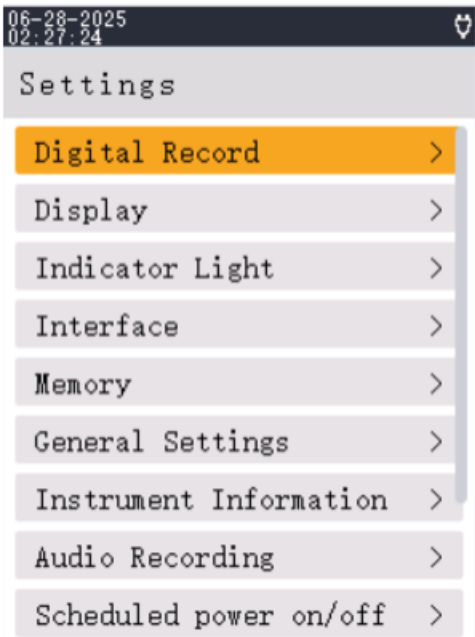


Figure 6.28

6.5.2 Digital Record Settings

Select "Digital Record" in the Settings interface, and press the OK key to enter the Digital Record settings interface, as shown in the Figure 6.29.

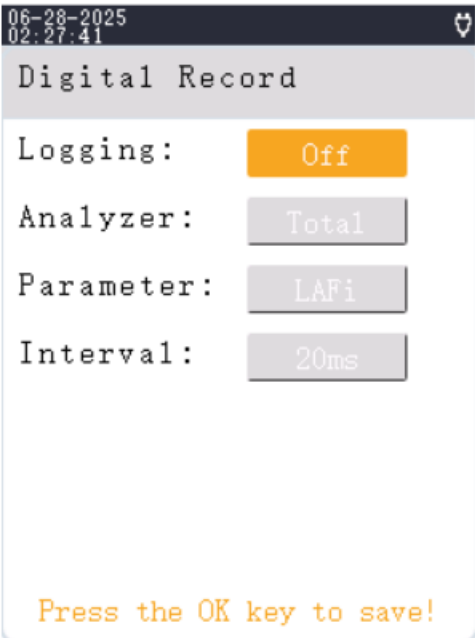


Figure 6.29

- 1) Record Function: Default is OFF. When OFF, modules, indicators, and interval options are grayed out. Press the Parameter key to toggle ON/OFF. When ON, options become active. When the integration is activated, the system stores data based on the selected "Index" and "Interval", which can be viewed directly in "Access", and can also be opened by exporting them to the computer through USB Mode or through the computer software.
- 2) Function Module: Enabled when Record = ON. Default is Total Value and can be switched between Total and Statistics by the Parameter key.
- 3) Indicators: Default: The default is "LAFi" when the options of "Module" are "Total" and "Statistics". Options include All, LAFi, LASi, LAIi, LAeq,t, LCFi, LCSi, LCIi, LCeq,t, LZFi, LZSi, LZIi, LZeq,t.
- 4) Interval: Recording interval. Default is 20 ms. When "Logging" is "Open", it shows that the default recording interval is 20 ms; adjustable from 20 ms to 5000 ms using the Parameter key.

### 6.5.3 Display Settings

Select "Display" in the Settings interface, and press the OK key to enter the Display settings interface.

- 1) Backlight Timeout: Default is Always ON. Options range from Always ON to 10-900 seconds (increments of 10s).
- 2) Backlight Brightness: Default is 25 and ranges between 4-49. Adjustable using the Parameter key; higher values increase brightness.

### 6.5.4 Indicator Light Settings

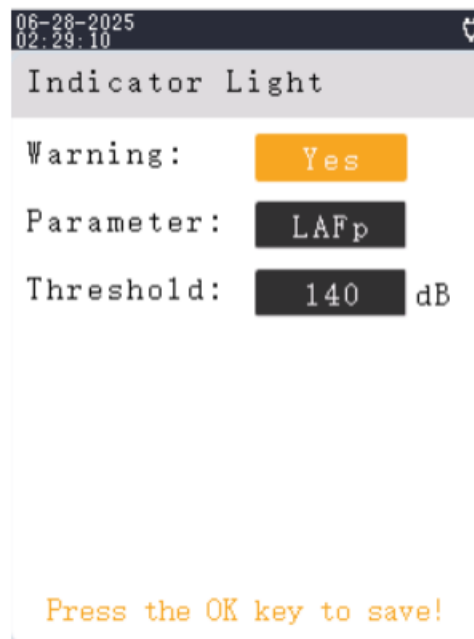


Figure 6.31

Select "Indicator Light" in the Settings interface, and press the OK key to enter the Indicator Light settings interface, as shown in the Figure 6.31.

When the “Warning” is enabled, the Parameter and Threshold can be set. When the Parameter is higher than the set Threshold and continues for some time, the indicator light at the bottom of the instrument will light up and its color will be red.

Threshold Indicators: Select from LAFp, LAsp, LAIp, LCFp, LCSp, LCIp, LZFP, LZSp, LZIp.  
Threshold Value: Adjustable from 40-140 dB (default: 140).

### 6.5.5 Interface Settings

Select “Interface” in the Settings interface, and press the OK key to enter the Interface settings interface, as shown in the Figure 6.32.

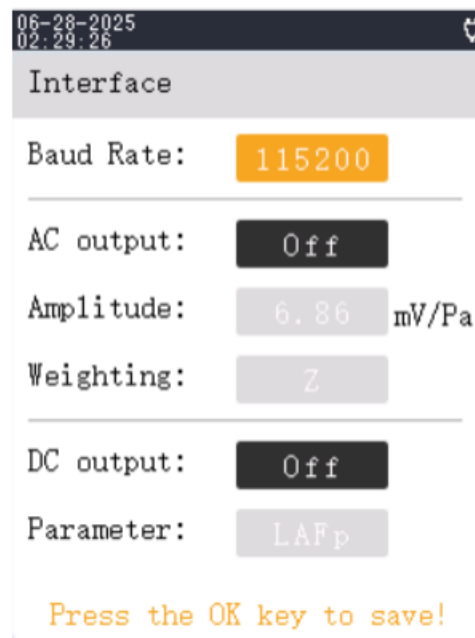


Figure 6.32

- 1) Serial Baud Rate: Can choose from 4800, 9600, 115200.
- 2) AC Output: ON/OFF
- 3) AC Amplitude: Can choose from 6.86 mV/Pa, 686 mV/Pa
- 4) AC Weighting: Can choose from Z, A, C
- 5) DC Output: ON/OFF
- 6) DC Indicators: Can choose from LAFp, LAsp, LAIp, LAeq,t, LCFp, LCSp, LCIp, LCEq,t, LZFP, LZSp, LZIp, LZeq,t

### 6.5.6 Memory Settings

Select “Memory” in the Settings interface, and press the OK key to enter the Memory settings interface, as shown in the Figure 6.33.

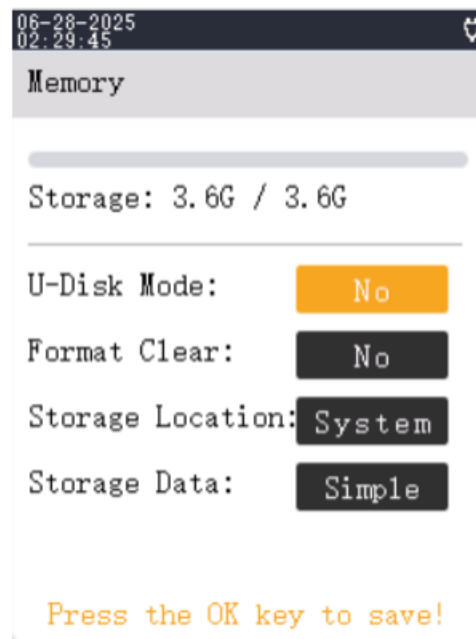


Figure 6.33

- 1) Storage Info: Displays total and available storage.
- 2) USB Mode: When set to "Yes," the device acts as a USB drive for data export.
- 3) Formatting: Confirm twice to erase all data.
- 4) Storage Location:
  - a. System: Internal memory used when no TF card is inserted. When the built-in memory card is full, additional data can be stored by deleting the measurement data through the "Formatting" function, or connect the device to a computer via a USB cable to export and delete the data.
  - b. TF Card: When a TF card is inserted, data can be stored on the TF card. If the TF card becomes full, you can use the device's "Formatting" function to clear the stored measurement data, or connect the device to a computer via a USB cable to export and delete the data.

Note: Under the current system, storage will not automatically switch to another location when full. For example, if the TF card is selected and becomes full, you must either delete the data on the TF card, replace the card, or manually switch the storage location to the internal system memory.
- 5) Data Storage Type:
  - a. Simple: Only stores data for selected frequency/time weighting
  - b. All: Stores all integration data across all weightings

### 6.5.7 General Settings

Select “General Settings” in the Settings interface, and press the OK key to enter the General settings interface, as shown in the Figure 6.34.

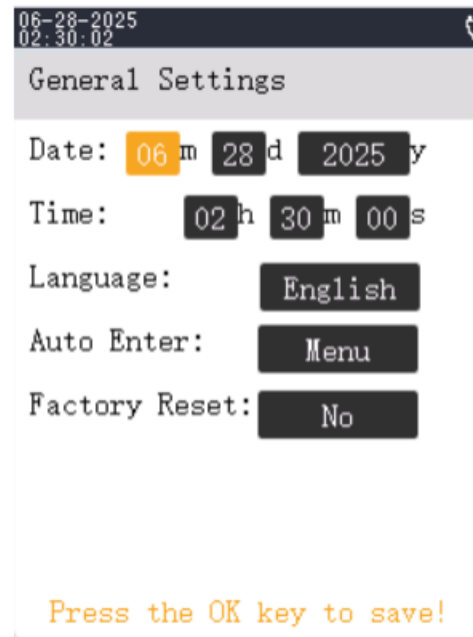


Figure 6.34

- 1) Date: Use cursor to select year/month/day, adjust using Parameter key, then press the OK key to save.
- 2) Time: Same method as Date.
- 3) Language: Toggle using Parameter key, press the OK key to apply.
- 4) Startup Interface: Can choose from Main Menu, Total Value, Statistical. Used with scheduled power-on for auto-measurement.
- 5) Restore Factory Settings: Confirm twice to reset all settings (excluding sensitivity, data, calibration records, clock).



### 6.5.8 Instrument Information

Select “Instrument Information” in the Settings interface, and press the OK key to enter the Instrument Information interface, as shown in the Figure 6.35.

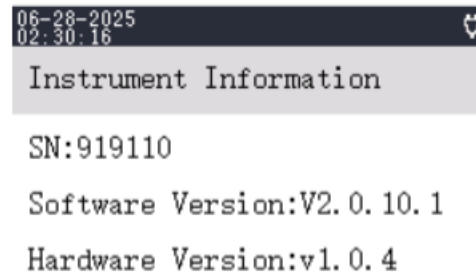


Figure 6.35

- 1) Serial Number
- 2) Software Version
- 3) Hardware Version
- 4) Applicable Standards and Accuracy Level
- 5) Technical Support Contact Info

### 6.5.9 Recording Settings

Select “Audio Recording” in the Settings interface, and press the OK key to enter the Audio Recording settings interface, as shown in the Figure 6.36.



Figure 6.36

- 1) Recording: Press the Parameter key to switch to “ON” for recording settings to be changed
- 2) Function Type: Defaults to Total Value. Can choose from Total Value, Statistical
- 3) File Type: Can choose from WAV, MP3
- 4) Sampling Rate: Can choose from 12 kHz, 24 kHz, 48 kHz
- 5) Bit Depth: Can choose from 16-bit or 24-bit (MP3 supports 16-bit only)
- 6) Start Mode: Can choose from Synchronized or Over-limit
  - a. Synchronized Mode: Recording starts and stops with measurement. Files are saved to the corresponding folder. If recording exceeds 1 hour, files are split into 1-hour segments.
  - b. Over-limit Mode:
    - a) Threshold: Recording starts when instantaneous LAFp exceeds threshold (can change to any value between 20-140 dB)
    - b) Duration: When the instantaneous LAFp value exceeds the set threshold, recording begins and continues for a duration adjustable between 10 to 3600 seconds. If the measurement ends before the full recording duration is reached, the recording continues until the preset time is completed. If the threshold is still exceeded when the set duration ends, the device will save the audio file and continue recording in segments based on the preset recording duration, until the noise level drops below the threshold or the over-limit recording function is turned off.

Note: When a Total Value Integration measurement starts, recording starts simultaneously. Once the measurement ends, the recording also ends and is saved in the same folder. The recording duration matches the measurement duration ( $T_m$ ). Because recording files are large, extended use of the recording function may quickly consume storage space, leading to memory shortages, sluggish performance, or failed data saves. Therefore, use the recording function with caution during long-term measurements, and delete large files such as recordings as needed to free up space.

#### 6.5.10 Scheduled Power On/Off

Select "Scheduled Power On/Off" and press the OK key to enter the Scheduled Power On/Off settings interface (Figure 6.37).

06-28-2025  
02:31:01

Scheduled power on/off

Analyzer: On

Power on:

01 d 00 h 00 m 00 s

Power off:

01 d 00 h 00 m 00 s

Press the OK key to save!

Figure 6.37

- 1) Function: Toggle ON to enable setting startup and shutdown times. When set, the device will automatically power on/off at the configured times.
- 2) Startup Time: The cursor can be moved to the day, hour, or minute fields, and adjustments can be made using the parameter key. When a field reaches its limit, it will display "\*\*\*" (note that seconds cannot be set to "\*\*\*"). This means that the corresponding field will be ignored during the scheduled power-on check, allowing for flexible scheduling such as powering on every hour, every day, or every month. Users can set one specific time in this row; when the system clock reaches that time, the instrument will automatically power on. For example, "\*\*\* 08:00:00" means the instrument will power on every day at 8:00 AM, while "\*\*\* \*\*:08:00" means it will power on at the 8th minute of every hour. The detailed setting process is similar to that in section 6.2.1.4, Total Value Integration Settings.
- 3) Shutdown Time: Configured the same way as startup.

### 6.5.11 Bluetooth

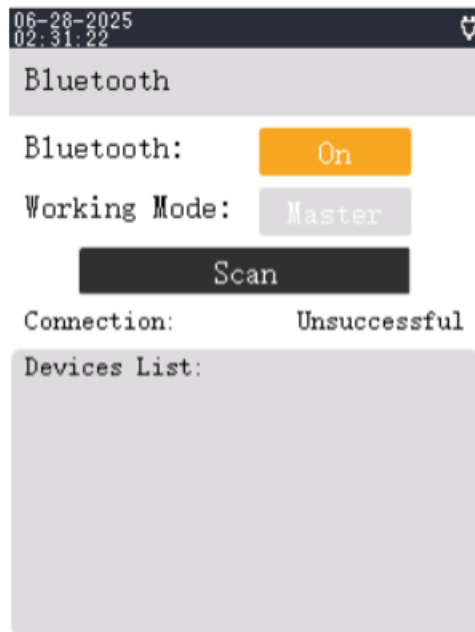


Figure 6.38

Select "Bluetooth" and press the OK key to enter the Bluetooth settings interface (Figure 6.38).

- 1) Enable Bluetooth: Default is OFF. Use the Parameter key to turn ON.
- 2) Bluetooth Mode: Once enabled, the mode is displayed as "Master" and cannot be changed. This allows the instrument to wireless print measurement data using a compatible Bluetooth printer. After selecting "Search" using the cursor key and pressing the OK key, the device will begin scanning for available devices. When the search is complete, a list of discovered device names will be displayed. Use the up/down keys to select the desired device for connection.

For example, to connect a Bluetooth printer, select the printer's name from the list using the up/down keys. Press Confirm, and a prompt will appear asking for a pairing code. Enter the default code "0000" and press the OK key again to initiate the connection. Once the connection is successful, the Bluetooth icon in the instrument's status bar will change from red to green, and the connection status area will display "Connected" along with the name of the connected Bluetooth device.

Note: Simply enabling Bluetooth and pressing the OK key will not save the configuration. You must successfully connect to a Bluetooth device before the settings can be saved.

### 6.5.12 Printer

Select “Printer” and press the OK key to enter the Printer settings interface (Figure 6.39).



Figure 6.39

- 1) Connection Type: Default is Serial. Can switch to Bluetooth.
  - 2) Print Mode: Default is No Image. Can switch to With Image.
  - 3) Output Mode: Default is Manual. Can switch to Auto.
    - a. Manual Mode: After selecting the printer connection type and print mode, choose “Manual” as the output mode. Then open the data details screen from the data review interface and press the Start key to print manually.
    - b. Auto Mode: After selecting the printer connection type and print mode, choose “Automatic” as the output mode. Then select the output module to be automatically printed. When that module’s measurement ends, the system will automatically print the measurement record.
- Note: Manual printing is still supported under automatic mode.
- 4) Output Module: The default is “Total Value”. Other available modules include: Total Value, Statistics, Sound Exposure Level, 1/1 OCT, and 1/3 OCT.
    - a. Serial Printing: Connect the instrument and printer via a serial cable. Turn on the printer and ensure the cable is correctly connected. In the Settings > Interface menu, set the baud rate to 115200 (see Figure 6.32). Select “Serial” as the printer connection type and press the OK key to save. Then go to Settings > Output Settings and set the connection protocol to “IO” (see Figure 6.40). Finally, open the data details screen from the data review interface and press the Start key to print.
    - b. Bluetooth Printing: Turn on the printer and connect it via Bluetooth as described in section 6.5.11. Select “Bluetooth” as the printer connection type and press the OK key to save. Then open the data details screen from the data review interface

and press the Start key to complete Bluetooth printing.

Note 1: Only .AWA files can be printed. Other file types are not supported. If the folder contains other types, the system will skip them during printing.

Note 2: Serial printing requires the baud rate to be set to 115200. If not, printing errors or garbled results may occur.

Note 3: For serial printing, the connection protocol must be set to "IO"; otherwise printing will fail.

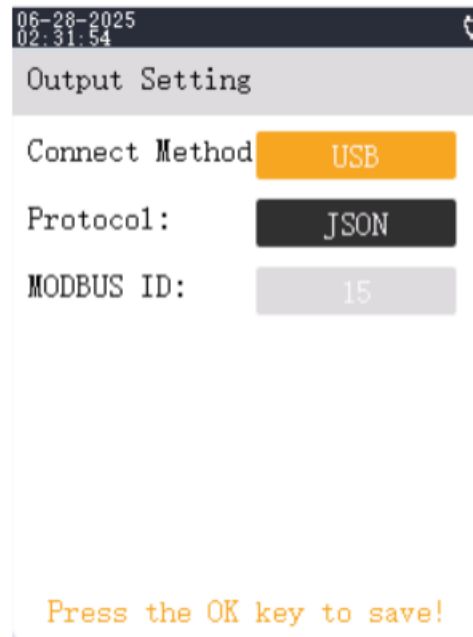


Figure 6.40

### 6.5.13 Output Settings

Select "Output Settings" and press the OK key to enter the Output settings interface (Figure 6.40).

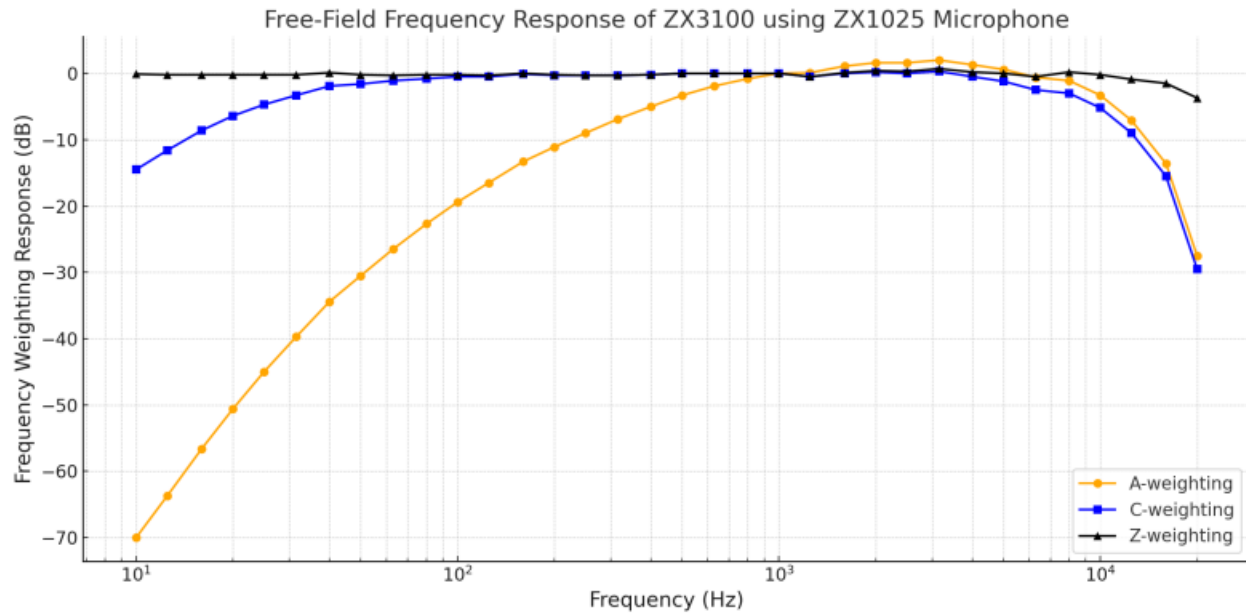
- 1) Connection Type: Default is USB. Can switch to IO.
- 2) Protocol Type
  - a. When USB is selected, the protocol can be JSON only.
  - b. When IO is selected, protocol can be either JSON, AWA, or MODBUS, with JSON as the default.
- 3) MODBUS ID
  - a. Only configurable when Connection is IO and Protocol is MODBUS.
  - b. Ranges between 1-255 and adjustable using the Parameter key.

Note 1: When using data transmission software, it is recommended to use the USB protocol; using the IO serial protocol may result in abnormal file parsing speeds.

Note 2: When using an automatic calibration platform, it is recommended to use the USB serial protocol for faster calibration.

## Appendix A: Free-Field Response

Nominal Free-Field Response in the Reference Direction of the Sound Level Meter with ZX1025 Microphone Under Approximate Reference Environmental Conditions.



Frequency (Hz)	A	C	Z
10	-70	-14.5	-0.1
12.5	-63.7	-11.6	-0.2
16	-56.6	-8.6	-0.2
20	-50.6	-6.4	-0.2
25	-45	-4.7	-0.2
31.5	-39.7	-3.3	-0.2
40	-34.4	-1.9	0.1
50	-30.5	-1.6	-0.2
63	-26.5	-1.1	-0.3
80	-22.7	-0.8	-0.2
100	-19.4	-0.5	-0.2
125	-16.5	-0.5	-0.3
160	-13.3	-0.1	0
200	-11.1	-0.3	-0.2
250	-9	-0.3	-0.3
315	-6.9	-0.3	-0.3
400	-5	-0.2	-0.2

Frequency (Hz)	A	C	Z
500	-3.3	0	0
630	-1.9	0	0
800	-0.8	0	0
1000	0	0	0
1250	0.1	-0.5	-0.5
1600	1.1	0	0.1
2000	1.6	0.2	0.4
2500	1.6	0	0.3
3150	2	0.3	0.7
4000	1.3	-0.5	0.2
5000	0.6	-1.2	0
6300	-0.6	-2.5	-0.5
8000	-1.1	-3	0.2
10000	-3.3	-5.2	-0.2
12500	-7.1	-9	-0.9
16000	-13.6	-15.5	-1.5
20000	-27.5	-29.5	-3.7

## Appendix B: Directional Response

When the ZX3100 sound level meter is equipped with the ZX1025 measurement microphone, it exhibits the following directional response characteristics.

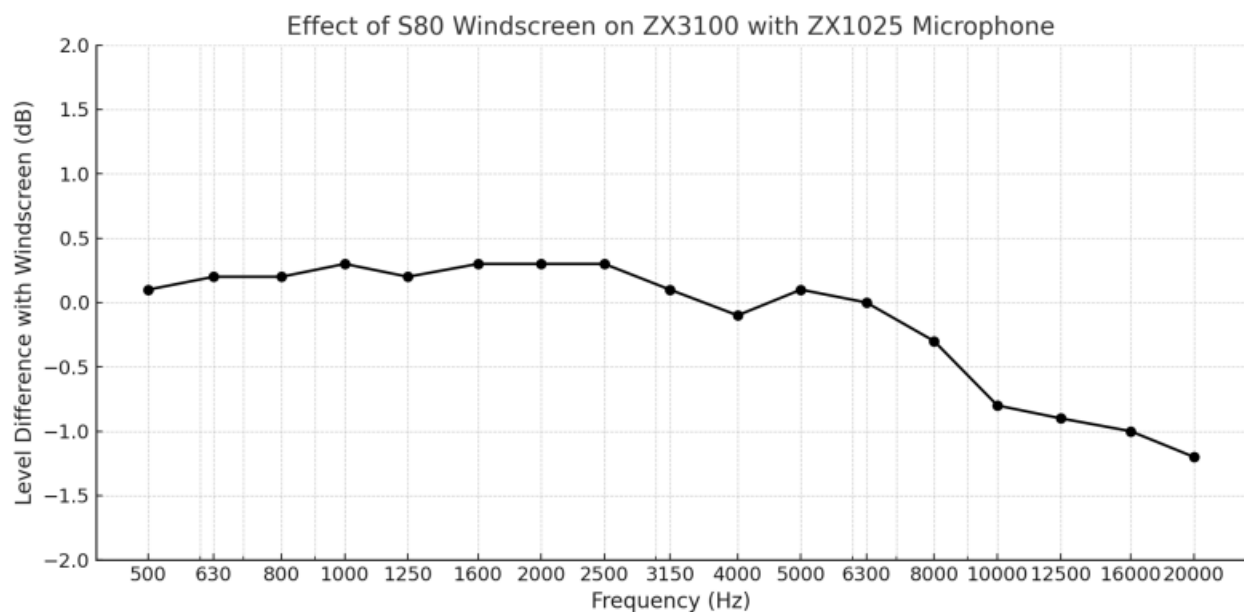
Appendix B shows the maximum absolute difference in indicated sound level (in dB) between any two sound incidence angles within  $\pm\theta^\circ$  from the reference direction.

Frequency (Hz)	30°	60°	90°	120°	150°	180°
250	0	0	0	0	0.2	0.1
315	0	0	0	0.1	0.2	0
400	0	0	0.1	0.1	0.2	0.1
500	0	0	0.1	0.3	0.3	0.2
630	0	0	0.1	0.3	0.5	0.2
800	0	0.1	0.1	0.3	0.4	0.2
1000	0	0	0.1	0.2	0.4	0
1250	0.1	0.2	0.4	0.3	0.3	0.1
1600	0.1	0.2	0	0.1	0.6	0.1
2000	0.1	0.7	0.5	0.1	1.2	0.1
2500	0.2	0.4	0.7	0.9	1.7	0.2
3150	0.9	0.8	2.4	1.7	2.5	0.3
4000	0.4	0.1	0.8	0.6	0.6	0.9
5000	0.7	1.2	1.2	2.5	1.8	1.5
6300	0.4	0.4	2.5	2.9	2.6	2
8000	0.7	2.7	4.4	6.1	4.2	3.1
10000	1.4	3.1	5.7	6.2	5	3.8
12500	1.5	3.2	5.5	7.6	8.3	7.3
16000	0.9	4	7.7	10.6	8.2	9.3
20000	1.8	6	10.9	13	11.2	14.4



## Appendix C: Windscreen Effects

Effect of the S80 windscreen on the measured response of the ZX3100 sound level meter.



Frequency (Hz)	Windscreen Effect with ZX1025 (dB)
500	0.1
630	0.2
800	0.2
1000	0.3
1250	0.2
1600	0.3
2000	0.3
2500	0.3
3150	0.1
4000	-0.1
5000	0.1
6300	0
8000	-0.3
10000	-0.8
12500	-0.9
16000	-1
20000	-1.2

## Appendix D: Enclosure Effect

Frequency (Hz)	Enclosure Correction (dB)
500	-0.4
630	0.1
800	-0.2
1000	-0.2
1250	0
1600	0.1
2000	0.4
2500	-0.3
3150	-0.4
4000	-0.2
5000	-0.4
6300	0.5
8000	-0.8
10000	-0.6
12500	-0.5
16000	-0.2
20000	-0.5

## Appendix E: Effect of Extension Cable

The following table provide the signal attenuation (in dB) observed at that frequency when the input is a 140 dB SPL equivalent, and the microphone is connected via a cable of the specified length.

Signal attenuation caused by different cable lengths depends on the input voltage. The higher the input voltage, the greater the attenuation. The values provided here are based on an input of 140 dB at the nominal sound pressure level.

Frequency (Hz)	5 meter	10 m	15 m	20m	30 m	40 m	50 m	100 m
250	0	0	0	0	0	0	0	0
315	0	0	0	0	0	0	0	0
400	0	0	0	0	0	0	0	-0.2
500	0	0	0	0	0	0	0	-0.4
630	0	0	0	0	0	0	-0.1	-0.8
800	0	0	0	0	0	-0.1	-0.2	-1.3
1000	0	0	0	0	0	-0.2	-0.4	-2
1250	0	0	0	0	-0.2	-0.4	-0.8	-2.8
1600	0	0	0	-0.1	-0.4	-0.7	-1.3	-3.9
2000	0	0	-0.1	-0.2	-0.7	-0.9	-1.9	-4.9
2500	0	0	-0.2	-0.4	-1.2	-1.5	-2.5	-6
3150	-0.1	-0.1	-0.4	-0.7	-1.7	-2.6	-3.5	-7.3
4000	0	-0.2	-0.7	-1.1	-2.4	-3.4	-4.4	-8.6
5000	0	-0.4	-1.3	-1.8	-3.1	-4.3	-5.4	-9.9
6300	0	-0.8	-1.7	-2.4	-3.9	-5.3	-6.5	-11.3
8000	-0.2	-1.3	-2.4	-3.3	-5	-6.5	-7.9	-13.2
10000	-0.4	-1.9	-3	-4	-6.1	-7.8	-9.5	-15.1
12500	-0.7	-2.6	-4	-5.3	-7.8	-9.7	-11.4	-17.1
16000	-1.1	-3.4	-5.2	-6.8	-9.5	-11.4	-13.1	-19
20000	-2	-4.3	-6.6	-8.3	-11	-13.1	-14.9	-20.8