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0011-FA25
SOUND LEVEL METER OPERATION MANUAL

PLEASE SCAN QR CODE TO WATCH THE OPERATION VIDEO OF PRODUCTS.

VIDEO

Caution

1. Read this manual carefully before using the instrument for the first time.

2. The broken diaphragm of the measurement microphone is not covered by the warranty.

3. Other damage caused by improper operation is not covered by the warranty.

FAQ

1.Signals are significantly abnormal

Solutions:

Check the diaphragm of the microphone for damage.

2. When calibrating, the warning message "The difference between this calibration and the previous result is greater than 3 dB and cannot be saved".

Solutions:

a. Check the microphone for damage.

b. If the microphone is normal, the sensitivity level can be changed manually in the "Microphone Setup" section of "Calibration".

1 Overview

The 0011-FA25 (Sound Level Meter) adopts digital signal processing technology, modular design, with the advantages of big measurement range, power saving, small size, reliable and stable long-term operation. The product complies with the relevant requirements of GB/T 3785.1-2010 and IEC 61672-1:2013 standards.

This series of products are mainly used in various noise monitoring situations, such as automatic urban environmental noise monitoring, traffic noise monitoring, air interface noise monitoring, online monitoring of noise pollution sources (such as construction sites, factory boundaries, road vehicles, etc.), online monitoring of workplaces, etc. It applicable to short-term monitoring and long-term fixed point monitoring. It can be individually networked or easily integrated into various existing environmental monitoring systems.

2 Main features

1) Digital signal processing technology with a wide measuring range

2) Parallel time weighting and frequency weighting

3) Small size, easy installation, suitable for big scale deployment

3 Main performance indicators

1) Microphone

   Class 2: Prepolarized Measurement Condenser Microphone

2) Measurement range

   25 dB(A)～141 dB(A)；35 dB(C)～141 dB(C)；50 dB(Z)～141 dB(Z) ；

   Other frequency linear ranges:

   31.5 Hz: 26 dB(A)～101 dB(A)；12.5 kHz：25 dB(A)～136 dB(A)

   Note1: Standard sensitivity-35.0dB, The measurement range varies with the sensitivity level.

   Note2: Where no level is specified, this means that it applies to all levels, the same below.

3) Frequency range:

   Class 2: 20Hz～12.5 kHz

4) Noise of this machine:

   <17dB(A)； <23 dB(C)； <33 dB(Z)

5) Frequency-weighted:

   Parallel A/C/Z weightings.

6) Time-weighted:

   Parallel F(Fast),S(Slow),I(Impulse) weightings.

7) Basic functions:

   Lp，Leq,t，Leq,T，Lmax，Lmin，Lpeak，SEL，etc.

8) Degree of accuracy:

   Class 2:

   Comply with standard: GB/T 3785.1-2010/IEC 61672-1:2013 Class 2

   Comply with standard: GB/T 3241-2010/IEC 61260-1:2014 Class 2

9) Data storage: 4 MB Flash RAM

10) Number of storage groups (basic analysis function)：512 groups.

11) Other storage: 4 sets of parameter templates, 128 measurement point names, 64 calibration records.

12) Measurement Time Duration: 1 s to 24 h

13) Real Time Clock(RTC): Less than 1 minute of error per month.

14) Data interface: RS485,DC signals, AC signals.

15) Display: 1.97 inch 128 x 64 dot matrix OLED screen.

16) Power consumption（basic functions）：<80 mA/5 V.

17) Power supply:

   4 x AAA alkaline batteries: approx. 10 h continuous operation.

   External power supply and interface: 5V/1A, USB Type-C interface or DB9 socket access.

18) Mainframe size: 172×69×26 mm.

19) Conditions of use:

--Temperature: -10 °C∽50 °C

--Relative humidity: 25 %∽90 %

--Atmospheric pressure: 65 kPa∽108 kPa

4 Terms and Definitions

4.1 Terms and definitions of instrument screen

"LFp"

Maximum of F-weighted time weighted sound pressure level in one second

"LSp"

Maximum of S-weighted time weighted sound pressure level in one second

"LIp"

Maximum of I-weighted time weighted sound pressure level in one second

"Leqt"

Short-time equivalent sound pressure level, t is the integration average time, the measurement interface is 1 s. When recording,t is determined by the recording interval, 0.2s to 60s is selectable

"LeqT"

Equivalent continuous sound pressure level, T is the integration average time, which can be set between 1s and 24h

"Lpeak"

Peak sound pressure level

"LFmax"

Maximum of F-weighted time weighted sound pressure level

"LFmin"

Minimum of F-weighted time weighted sound pressure level

"LSmax"

Maximum of S-weighted time weighted sound pressure level

"LSmin"

Minimum of S-weighted time weighted sound pressure level

"LImax"

Maximum of I-weighted time weighted sound pressure level

"LImin"

Minimum of I-weighted time weighted sound pressure level

"SEL"

Sound exposure levels

"Volt."

Voltage

"RTC"

Real Time Clock

"OVER"

Number of overloads

"Tm"

Measurement time

"Ts"

Preset measurement time

"F"

Data is full

4.2 Definition of common acoustic measurements

Peak sound pressure

The absolute value of the maximum instantaneous sound pressure during a specified time interval.

Peak sound level

The peak sound pressure is obtained by multiplying the logarithm of the ratio of the peak sound pressure to the reference sound pressure with a base of 10 by 20. The peak sound pressure is obtained using standard frequency-weighted.

Time-weighted

A time exponential function specifying a time constant which is weighted to the square of the instantaneous sound pressure.

Time-weighted sound level

The time-weighted sound level is the logarithm of the ratio of the square root mean sound pressure to the reference sound pressure multiplied by 20 on a base of 10. The square root mean sound pressure is obtained from standard frequency weighting and

standard time weighting.

Note 1: Time weighted sound levels are expressed in decibels (dB).

Note 2: Letter Symbols of Time-weighted sound levels e.g. F and S, Frequency-weighted sound level e.g.A and C, are expressed LAF、LAS、LCF、和 LCS

Note 3: The A-weighted and time-weighted sound levels $L_{A\tau}(t)$ of t are denoted by the following equation:

$$L_{A\tau}(t) = 20\lg\{[(1/\tau)\int_{-\infty}^{t} p_A^2(\xi)e^{-(t-\xi)/\tau}d\xi]^{1/2}/p_0\} \cdots\cdots (1)$$

In the equation::

τ—— The exponential time constant of the time weighted F or S

ξ—— The variable of the time integral from some time in the past, such as the lower bound -∞, to the observation time t;

$p_A(\xi)$ —— A-weighted instantaneous sound pressure

p_0 —— Reference sound pressure

— time-average sound level

— equivalent continuous sound level

The time-weighted sound level is the logarithm of the ratio of the square root mean sound pressure to the reference sound pressure multiplied by 20 on a base of 10. The sound pressure is obtained from a standard frequency weighting.

Note 1: Time-average sound levels and equivalent continuous sound level are expressed in decibels (dB).

Note 2: Time-average A weighted sound level is expressed by symbol L_{AT} or L_{AeqT} and it is given by the following equation:

$$L_{AT}=L_{AeqT}=20\lg\{[(1/T)\int_{t-T}^{t}P_A^2(\xi)d\xi]^{1/2}/p_0\} \quad \cdots\cdots\cdots (2)$$

In the equation::

ξ——The variable of the time integral over the average time interval until the end of the observation time t

T——Average time interval

$p_A(\xi)$——A-weighted instantaneous sound pressure

p_0——Reference sound pressure

——sound exposure:

The time integral of the square of the sound pressure over a specified time interval or process.

Note 1: Note 1: The duration of integration is implicit in the time integral and does not need to be explicitly reinterfaceed, but the character of the process should be stated. For sound exposure measurements within a defined time interval (e.g. 1h), the duration of the integration should be indicated in the reinterface.

Note 2: The A-weighted sound exposure for a specified process is represented by the symbol E_A and is given by the following equation:

$$E_A=\int_{t_1}^{t_2}p_A^2(t)dt \quad \cdots\cdots\cdots (3)$$

In the equation:

p_A 2 (t) ——The square of the A-weighted instantaneous sound pressure during the integration time at the beginning of t1 and the end of t2. If the A-weighted sound pressure is in (Pa) and the running time is in seconds, then the A-weighted sound exposure unit is Pa squared in seconds (Pa^2s).

Note 3: For noise exposure measurements in the workplace, it is easier to use the units in Pa^2h (Pa squared hours), see GB/T 15952-2010.

——Sound exposure level

The sound exposure level is the logarithm of the ratio of the sound exposure to the reference sound exposure multiplied by 10 on a base of 10. The reference sound exposure is the product of the square of the reference sound pressure and the reference time interval of 1 s.

Note 1: Sound exposure levels expressed in decibels (dB).

Note 2: The relationship between the A-weighted sound exposure level LAE and the corresponding measured time-averaged A-weighted sound level LAT or LAeqT is expressed in the following equation.

$$SEL=10\lg\{[\int_{t1}^{t2}P_A^2(t)dt]/(p_0^2T_0)\}$$
$$=10\lg(E_A/E_0)=L_{AT}+10\lg(T/T_0) \quad \cdots\cdots\cdots (4)$$

In the equation:

E_A——A-weighted sound exposure in Pa^2s[See Equation(3)]

E_0 ——Reference sound exposure is 20 μPa) ^{2}× (1s) =400×$10^{-12}$$Pa^2$s;

T_0 ——1s;

$T=t_2-t_1$——Time intervals for sound exposure level and time-averaged sound level, s.

Note 3: The relationship between the time-averaged A-weighted sound level L_{AT} or L_{AeqT} over a time interval T and the total A-weighted sound exposure E_A over this interval is expressed in the following equation:

$$E_A = (p_0^2 T)\ (10^{0.1LAT}) \quad \text{..... (5)}$$

or

$$L_{AT}=10lg[E_A/(p_0^2 T) = SEL-10lg(T/T_0) \quad \text{..... (6)}$$

——Noise dose, Dose

$$Dose=[C1/T1+C2/T2+\text{.....}+Cm/Tm]\times 100 \quad \text{..... (7)}$$

In the equation:

Cm——Total exposure time at specified sound level

Tm——Time allowed at each sound level

$$Dose=100*2^{(TWA-CL)/R} \quad \text{..... (8)}$$

In the equation:

CL——Limited sound level, in dB

R——Exchange rate，generally, the value could be 3 or 4 or 5.

——Time-weighted average sound pressure level, TWA

It is a constant sound level equal to the sound exposure of the measured sound for a continuous period of 8 hours.

$$TWA=10*lg[(2^{(L1-CL)/R}+\text{.....}+2^{(Ln-CL)/R})*ts/28800] *R/3+CL... \quad (9)$$

In the equation:

Ln——The time-weighted sound pressure level above the threshold.

ts—— Sampling interval in s;

CL——Limited sound level in dB

R——Exchange rate: Generally, the value could be 3 or 4 or 5.

——Average sound pressure level, L_{AVG}

L_{AVG} is the average sound level measured during the measurement time

$$L_{AVG}=TWA+R/3*10*lg(8h/Tm) \quad \text{..... (10)}$$

In the equation:

R——Exchange rate: Generally, the value could be 3 or 4 or 5.

Tm——Measuring time in hours,h

——8-hour weekday speciated sound exposure level，$L_{ex,8h}$

$$L_{ex,8h}=L_{Aeq,Te}+10lg(T_e/T_0) \quad \text{..... (11)}$$

In the equation:

T_e——The effective duration of the weekday.

T_0——Reference Duration Time(equal to 8h)

5 Complete structure and standard working mode

5.1 construction

Fig.5-1 Appearance

The appearance of the instrument is shown in Figure 5-1. It consists of a microphone, preamplifier and mainframe. In normal operation the Measurement condenser microphone and preamplifier should be mounted on the head of the mainframe and they can be removed from the Sound Level Meter by means of knurled nuts, plus extension wires. The function of the socket pins between the preamplifier and the sound level meter is shown in Figure 5-1. The nominal effect of reflections caused by

the housing of the sound level meter and the pointing characteristics of the sound level meter at different directions of incidence are shown in Appendix C. The housing is injection moulded in ABS plastic and the battery is housed in a battery compartment, which can be easily replaced by removing the battery cover. The class 1 instrument overload indicator is located on the upper front and the class 2 overload indicator is located at the knurled nut of the preamplifier. The instrument can be charged and connected to a computer for data transfer via the USB interface on the bottom and the DB9 interface. The pins are defined and used as shown in Figures 5-2 and 5-3. The basic data measured is shown on a 128 x 64 dot matrix OLED.

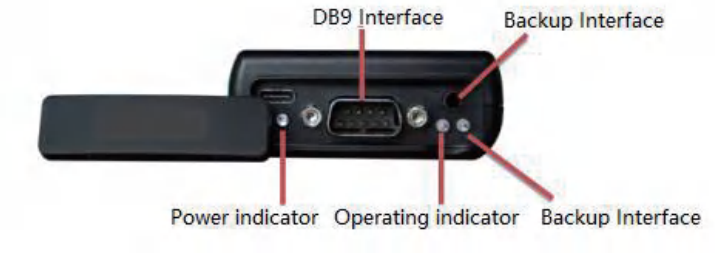


Fig.5-2 Bottom

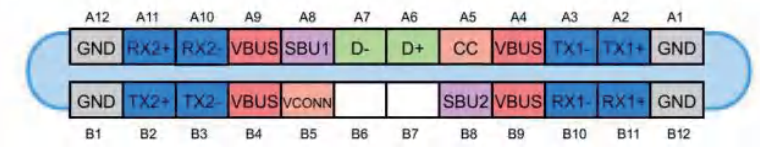


Fig.5-3 USB-Type-C_16 socket

On the bottom of the instrument are the USB-Type-C interface, the communication interface, and the operating and overload indicators. The communication interface is a DB9 socket interface with the following pin definition:

Pin number	Function	Pin number	Function
1	Power supply:+4.5V∽8.0V	6	Instrument reset: should normally be suspended
2	RXD/A+	7	Save, should normally be suspended
3	TXD/B+	8	RS485
4	Overrun output	9	Save, should normally be suspended
5	Power ground	--	

5.2 Button function

- Enter button: to go to the next menu level or to confirm the operation
- Exit button: to go back to the previous level or turn off the power
- Cursor key: to move the cursor to the next position
- Cursor key: to move the cursor to the previous position
- Parameter key: parameter at cursor location minus
- Parameter key: parameter at cursor location plus
- Power on reset button, instrument power on setting, or reset

5.3 Indicator Light

Name	Color	Function Description
Work	Green	Flashing every second indicates that the measurement is being integrated, a long light indicates that the measurement is paused.
Over	Red	When lighted, the peak value of the measured vibration exceeds the measuring range.
Limit	Red	When lighted, the peak value of the measured vibration exceeds the preset limit, the light goes out if the peak value of the measured vibration no longer exceeds the preset limit.

5.4 Key components

1) Measurement Microphone Note:No collisions

2) Preamplifier

5.5 Nominal Operating Mode

The 0011-FA25 Sound Level Meter comes standard as shown in Figure 5-1 and is internally powered by 4 AAA alkaline batteries.When the sound source is located in the axial direction of the microphone, it is the reference incidence direction (0º). When the instrument is rotated θº to the right with the microphone axis as the centre, it is called θº incidence of the sound source.

6 Display Interface

Press and hold the "ON/RESET" key on the instrument panel, the instrument will power on and display "Self-Check", if there is no error, it will enter the main menu interface and display as follows.

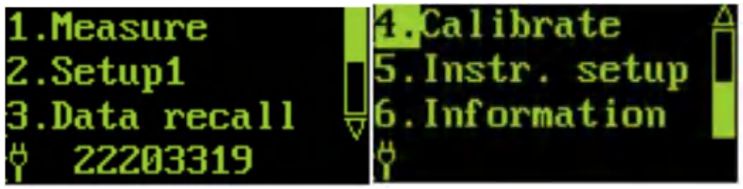


Fig.6-1 Main menu interface

In the main menu interface, if no key is pressed within 6 s, the instrument automatically enters the sub-menu interface. When the "Exit" key is pressed, the instrument returns to the previous menu level. In the main menu interface, when the "Exit" key is pressed, the instrument prompts " Will off, 3s". Press and hold for 3s to switch off the instrument.

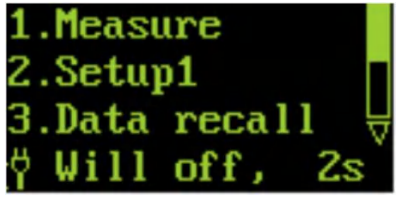


Fig.6-2 Prompt to switch off

6.1 Main menu

"1.Measure": the measurement submenu, which needs to be accessed for normal measurements.

"2.Setup1": The setup menu is mainly used for the measurement time, start mode, auto pause and auto start .

"3. Data Recall": data management sub-menu, to access and delete the data stored in the instrument.

"4.Calibrate": calibration sub-menu, to perform an acoustic calibration of the instrument and to consult the calibration records.

"5. Instr. Setup": Instrument setup menu with setup for power supply, hardware, clock and microphone type, etc.

"6.information": view information about the instrument.

6.2 Measurement interface

In the main menu, use the "cursor left/right" key to move the cursor to "1.Measure" and press the "Enter" key to enter the measurement sub-menu, which has various display interfaces such as: list interface, Big font Eye-catching interface, status information interface.

6.2.1 Big font Eye-catching interface

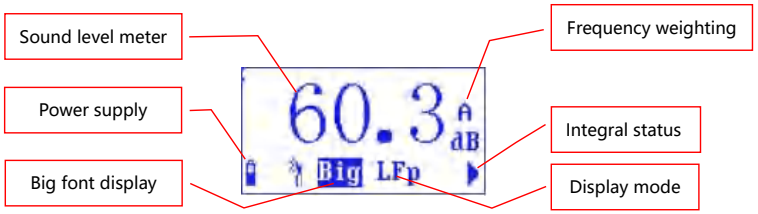


Fig.6-3 Big font Eye-catching interface

The big font displayed in the big text display screen allows only one measurement result to be displayed at once. The last line of the display shows the basic operating status of the instrument, from left to right, power supply, microphone pointing, display interface, display mode, integral status. In this screen the cursor can be moved between "Big", "LFp" and "A". Press "Enter" to start measurement and recording at the same time, press "Enter" again to pause, press "Exit" to bring up the message when measurement is started, press "Exit" when not in measurement to return to the main menu.

Table 6-1: Cursor position and post-operation in the large font display interface

Cursor position	After pressing "Parameters plus/minus" key	Remarks
Big	List、Stat.	Measurement interface switching
LFp	LSp、LIp、Leq,t、Lpeak 、Leq,T、LFmax、LSmax、LImax、LFmin、LSmin、LImin、SEL	Display indicator switching
Z	C A	Frequency weighting switching

Table 6-2 Operating status indication

Display	Status
	Externally powered
	Battery powered, high or low battery voltage, The symbol for undervoltage is:
	Microphone set up as diffusion field type
	Integrating measurements
	Integral measurement suspended
	The peak value of the measured signal exceeds the upper measurement limit
	The amplitude of the measured signal is below the lower measurement limit

6.2.2 List display interface

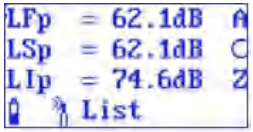


Fig.6-4 List display

Press the "Enter" key from the main menu or place the cursor on "Big" in the large font display and press the "Parameter plus/minus" key to enter the list display interface, as shown in Figure 6-4.

The bottom line of the screen shows the instrument's operating status, from left to right, power supply, microphone pointing, and display mode.

The top 3 lines of the screen show 3 different measurement indicators and the bottom line shows the operating status of the instrument. The meaning of the various icons is shown in Table 6-2.The first 5 characters of each of the first 3 lines are names of the measurement indicator and the last character is the frequency weighting. The cursor can be moved at "List", "LFp", "A" in line 1, "LSp", "C" in line 2, "LIp", "Z" in line 3. Press "Enter" to start measurement and recording at the same time, press "Enter" again to pause, press "Exit" to bring up the message when measurement is started, press "Exit" to return to the main menu when not in the measurement state.

Table 6-3: Cursor position and subsequence operations in list display

Cursor position	After pressing the "parameter plus/minus" key the display shows	Remarks
List	Other measurement interfaces	Measurement interface
LFp	LSp、LIp、Leq,t、Lpeak 、Leq,T、LFmax、LSmax、LImax、LFmin、LSmin、LImin、SEL、T_S、Volt、RTC、	Display indicator
A	C Z	Frequency weighting

6.2.3 Holding and clearing of maximum and peak sound levels

When no measurement is activated, indicators of integration, statistics, etc. are 0 dB. When the measurement is started by pressing the "Enter" button in the measurement screen, the maximum and peak values start to be displayed and have a hold function that refreshes when the noise exceeds the current hold value. To clear the current maximum and peak levels, you need to exit the measurement and rerun it.

6.3 Setup submenu

In the main menu, use the "cursor left/right" keys to move the cursor to "2. Setup1" and press "Enter" to enter the measurement setup sub-menu, which displays as follows.

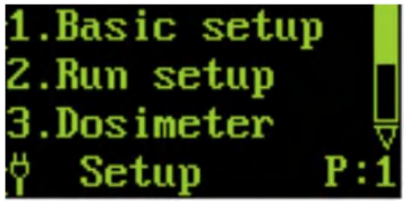


Fig.6-5 Measurement setup

6.3.1 Basic Setup

Place the cursor on "1. Basic Setup" and press "Enter" to go to page 1 of the basic setup, press the right cursor button to switch to page 2 of the basic setup.

Fig. 6-6 Basic Setup

6.3.1.1 Page 1 of Basic Setup

"Selection templates": the instrument has a large number of parameters that can be set so that the instrument can meet different national. The instrument has a wide range of parameters that can be set so that it can be used for different countries and for different measurement purposes. Due to the large number of parameters, they are set up in advance according to different standards and for different measurement purposes and divided into several groups, for which different names can be given, this is the parameter template, also called working mode. The user simply calls up the different parameter templates as required for the measurement without having to set each parameter, which makes it easy to use. By placing the cursor on the "Select template" and pressing the "Parameter plus/minus" key you can switch to another saved template and recall the saved combination parameters in the template. "Ts=00h00m10s": preset measurement time, after which the instrument automatically stops integral measurement, statistical analysis, data recording and saving of the measurement results. Adjustable from 1 second to 24 hours. Move the cursor to "Ts" and press the parameter plus/minus key, Ts can be set at 10 s, 30 s, 1 m, 5 m, 10 m, 15 m, 20 m, 30 m, 1 h, 2 h, 4 h, 8 h, 10 h, 12 h, 16 h, 24 h. Or move the cursor to h, m or s respectively and press the "parameter plus/minus" key to set.

"Name:DATA_0000": the name of the measurement point taken when saving the measurement results. The instrument can store up to 128 measurement point names internally for the user to choose from. Move the cursor over the "name" and press the parameter plus/minus key to switch.

"P:1": indicates that this is the first page of content.

The cursor can be moved over "Select template", "Ts", "h", "m", "s", "name" and press "Exit" to return to the measurement setup on page 1.

Table 6-4 Cursor positions and available options in Basic Setup, page 1

Cursor position	Available options	Remarks
Operating mode	Next pre-stored operating mode name	Calling other operating modes
Ts	10s、30s、1m、5m、10m、15m、20m、30m、1h、2h、4h、8h、10h、12h、16h、24h	Setting the measurement time
h	01h to 99h	Set hours
m	01m to 59m	Set minutes
s	01s to 59s	Set seconds
Name	Name of the next pre-stored measurement point	Calling other measuring point names

6.3.1.2 Page 2 of Basic Setup

On page 1 of the Basic Setup, move the cursor over "Name" and press the right cursor

button to go to page 2, which shows the following.

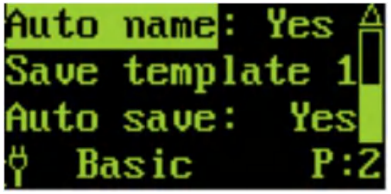


Fig.6-7 page 2 of Basic Setup

"Auto name": whether the instrument automatically selects the measurement point name. When automatic is selected, the instrument selects the next pre-stored measurement point name at the end of each measurement. Move the cursor to "Auto name" and press the parameter plus/minus key to switch between manual and automatic.

"Save to template": Save the current parameter to a template. Move the cursor here and press the "Enter" The "Save to template" display will read "Enter template name" and the cursor will automatically jump to the template name, press the parameter plus/minus key to set the template name. When you have finished setting the template name, press the Return key or the "Enter" key to finish setting the template name.

"Power off save setting": whether the current parameters are saved when the instrument is switched off. If you select yes, the parameters will be saved after the instrument is switched off and will be entered after the next switch-on, if you select no, the parameters will not be saved. Move the cursor over the "Shutdown save setting" and press the parameter key to set it.

The cursor can be moved over "Auto name", "Save to template" and "Shutdown save

setup", press "Exit" to return to page 1 of the measurement setup.

Table 6-5 Cursor positions and available options in Basic Setup, page 2

Cursor position	Available options	Remarks
Auto Name	Manual/Auto	Whether to take names automatically
Save to template		Save the current parameters to the template
Shutdown save setup	Yes/No	Whether the shutdown saves the setting parameters

6.3.2 Run Setup

Move the cursor to "2.Setup" and press "Enter" to enter the start-up setup screen. The Run Setup screen has 3 items: Run Mode, Auto Pause and Rerun Setup. This is shown in the figure below:

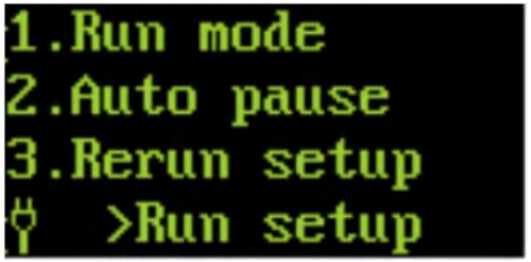


Fig.6-8 Run Setup

6.3.2.1 Run mode

Move the cursor over "1. Run mode" and press "Enter" to enter the run mode interface, which is shown in the figure below:

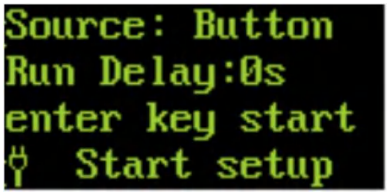


Fig.6-9 Run mode

"Run mode" : the trigger source for the start, with "Button", "Pose", "Limit", "Interval". "Clock" can be selected. The main uses of the various trigger sources are shown in the following table:

Table 6-9 Purpose of the start trigger source

	Run methods	Remarks
1	Button	Start by pressing the button
2	Clock	Start after counting down
3	Limit	Start after exceeding a set criterion
4	Interval	Start at specified intervals
5	Pose	This feature is currently not activated

1) Button Start

When select "Button", shows below:

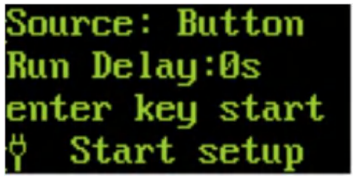


Fig.6-10 Button start

"Start Delay": Pressing the "Enter" key delays the measurement for a period of time, when followed by 2 s, it means that the measurement is started after 2s. The user can select between 0 and 9.

Note: When the user selects another start trigger mode, the Button start mode is still valid.

2) Clock Start

When Clock Start is selected, the following is displayed:

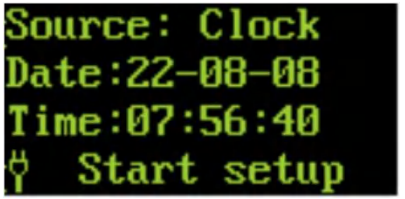


Fig.6-11 Clock Start

When "Clock" is selected, Date and Time appear in the bottom 2 lines of the display, where the user can enter a time and the instrument will start automatically when the clock reaches this time. The cursor can be moved to the year, month, day, hour, minute and second, and the corresponding year, month, day, hour, minute and second can be adjusted using the "parameter plus/minus" keys. When an item is set to the end "**" will be displayed to indicate that this item is not involved in the comparison during a timed start. This makes it possible to start hourly, daily and monthly .....

3) Limit Start

When "Limit" is selected, the instrument displays the following:

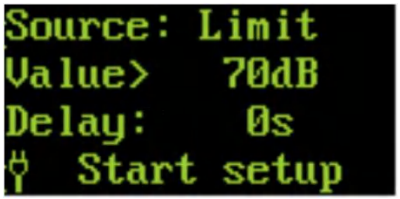


Fig.6-12 Limit Start

"Criterion": Above this value the instrument will initiate a measurement. This value can be selected between 40 dB and 140 dB.

"Continuous": Specifies the continuously overrun time. When the exponential average sound pressure level on channel 0 of the instrument, with time-weighted used for statistics, exceeds the limit, the measurement is started and will only continue if the continuous overrun time exceeds this "duration" value, otherwise the measurement is terminated. This value can be set between 0 s and 999 s.

4) Interval Start

When "Interval" is selected, the instrument shows the following:

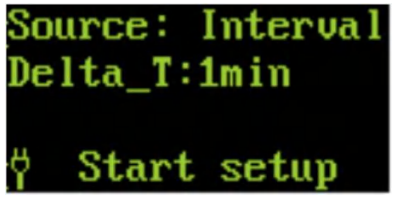


Fig.6-13 Interval Start

"Interval time": the interval between each start, user can choose between 1 min, 5 min, 10 min, 20 min, 30 min, 1 hour. 1 min means every full minute and 5 min means every full 5 minutes.

Note: When the set measurement time Ts is greater than this interval, the actual measurement time of the instrument ends earlier than the actual start interval.

6.3.2.2 Auto pause setup

Move the cursor to "Auto Pause Setup" and press the "Enter" key to show the following.

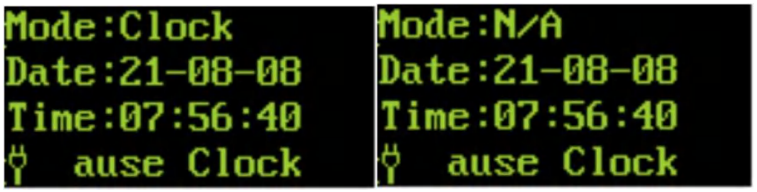


Fig.6-14 Auto pause setup

"Mode": Pause working mode. It can be selected between invalid or clock. When invalid is selected, the instrument will not be timed to pause; when clock is selected, the instrument will automatically pause when the instrument's internal clock reaches the time specified below.

"Date": the date of the pause.

"Time": the time of the pause.

The cursor can be moved to the year, month, day, hour, minute and second and the corresponding year, month, day, hour, minute and second can be adjusted with the "parameter plus/minus" key. When an item reaches the end of its range, "**" is displayed to indicate that it will not be compared when paused or rerun. This makes it possible to pause every hour, every day and every month at regular intervals.

It is suggested that after setting a timed pause, a timed rerun is also set so that

automatic measurements can be made.

6.3.2.3 Rerun Setup

Move the cursor to "Rerun Setup" and press the "Enter" key to enter the setup screen, which displays as follows:

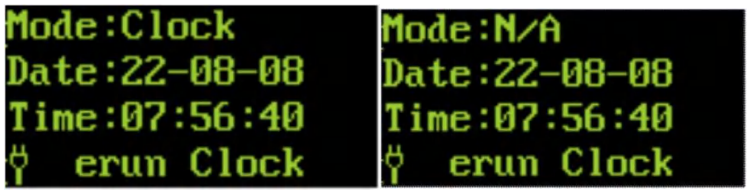


Fig.6-15 Rerun Setup

"Mode": Rerun working mode. It can be selected between invalid or clock. When invalid is selected, the instrument will not be timed to Rerun; when clock is selected, the instrument will automatically Rerun when the instrument's internal clock reaches the time specified below.

"Date": the date of the Rerun.

"Time": the time of the Rerun.

The cursor can be moved to the year, month, day, hour, minute and second and the corresponding year, month, day, hour, minute and second can be adjusted with the "parameter plus/minus" key. When an item reaches the end of its range, "**" is displayed to indicate that it will not be compared when Reruned. This makes it possible to Rerun every hour, every day and every month at regular intervals.

6.4 Data Recall

In the main menu, use the "cursor left/right" keys to move the cursor to "3.Data Recall" and press " Enter" key to enter the sub-menu, which shows the following:

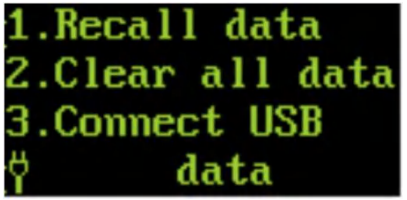


Fig.6-16 Data management submenu

6.4.1 Data recall

With the cursor on "1. Recall data", press the "Enter" key to display the following:

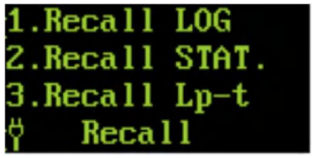


Fig.6-17 data recall

There are three types of data that can be saved inside the instrument

6.4.1.1 Operation History

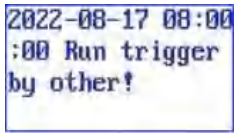


Fig.6-18 Operation History

The current log contains information about the start of the measurement. The operation record holds the time of the instrument key operation, the contents of the operation, and information on disconnection and connection to the server. Press the parameter plus key to view the previous record and the parameter minus key to view the next record. Press "Exit" to return to the previous menu level.

6.4.1.2 Recall measurement results

Fig.6-19 Recall measurement results

Move the cursor to "2.Recall STAT" And press "enter" key. The instrument displays the results of the saved statistics integration measurements, the content of which is related to the user's licence to purchase the embedded software. Press the parameter plus key to view the previous set of measurements, the parameter minus key to view the next set of measurements and the "exit" key to return to the previous menu level.

Due to the small size of the screen, only the first 100 bytes can be viewed when reviewing the measurement results.

6.4.1.3 Recall sound level records

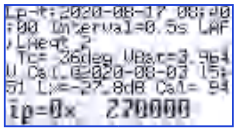


Fig.6-20 Recall sound level records

Move the cursor to "2.Recall STAT" And press 'enter' key. The instrument displays the results of the saved sound levels over time. The content is related to the "Record Setup". Press the parameter plus key to view the previous set of measurements, press the parameter minus key to view the next set of measurements and press the "Exit" key to return to the previous menu level.

Due to the small size of the screen, only the first 100 bytes can be viewed when reviewing the measurement results.

6.4.2 Clear all data

With the cursor on line 2 in the Data Management sub-menu display, press the "Enter" key and the instrument will display. The instrument will display as follows.

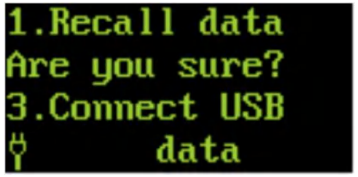


Fig.6-21 Clear all data

If you really want to clear all the data inside the instrument, press "Enter", otherwise press another key to return.

6.4.3 Data export

Connect the instrument to the PC with the USB cable and switch on the instrument. Move the cursor over "3. Connecting the USB interface" and press the "Enter" key,

then the USB indicator will light up, indicating that the instrument is connected and the measurement results can be obtained using the PC software.

6.5 Instrument calibration

In the main menu, use the "Cursor" key to move the light to "2. Instrument calibration" and press "Enter" to enter the calibration sub-menu, which displays as follows:

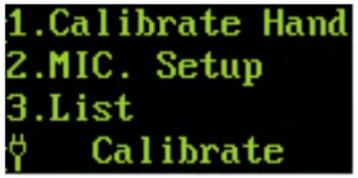


Fig.6-22 Calibration sub-menu

Line 1 is Sound Calibration, where the sensitivity of the instrument is calibrated using a sound level calibrator.

Line 2 is for Calibration Setup, which sets the sound pressure level of the sound level calibrator and also sets the sensitivity of the microphone.

Line 3 is Calibration Record, to view the instrument's calibration record.

6.5.1 Acoustic Calibration

Using the "Cursor" key, move the cursor to line 1 and press "Enter" to bring the instrument into the acoustic calibration interface, which displays the following:

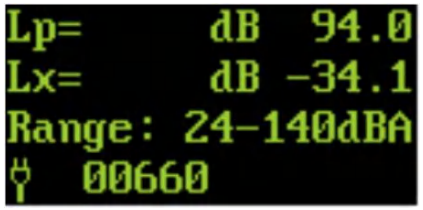


Fig.6-23 Acoustic calibration of microphone

"Lp= dB 94.0": the following 94.0 is the sound pressure level of the acoustic calibrator, i.e. the sound pressure level to which the instrument will be calibrated. The parameter after "Lp=" shows the C-weighted sound pressure level measured by the instrument during the calibration.

"Lx= dB -34.0": "-34.0" is the sensitivity level of the microphone. After "Lx=" the newly calibrated microphone sensitivity level from the calibration process is displayed.

The instrument is calibrated by attaching an acoustic calibrator to the microphone, switching the acoustic calibrator on and pressing the "Enter" button. The lower right hand corner of the screen shows a value from 1 to 9, and stops when 9 is displayed, indicating the end of the calibration.Pressing the "Enter" button again will save the current newly calibrated microphone sensitivity level. If the difference between the current calibration result and the previous one is more than 3 dB, the result will not be kept and the microphone will need to be checked or doing a recalibration.

"Range": indicates the measurement range at the current sensitivity level. The measurement range is shifted according to the sensitivity level, e.g. if the sensitivity level is -33.8 dB, the dynamic range of the instrument will be "24-140 dBA".

6.5.2 Microphone Setup

In the Calibration sub-menu, move the cursor to line 2 and press the Enter key to enter the microphone setup interface, which displays as follows:

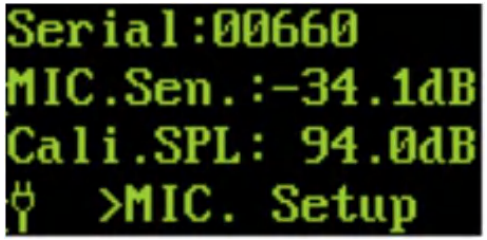


Fig.6-24 Microphone Setup

"Serial number": The serial number of the microphone, which is set by the manufacturer before leaving the factory and cannot be modified by the user.

"Sensitivity level": The sensitivity level of the microphone. When the cursor is here, press the "Parameter" key to adjust the sensitivity level of the microphone.

"Calibrated sound level": sound pressure level of the acoustic calibrator

When the sound pressure level of the user's sound calibrator is not 94.0 dB, move the cursor to "Calibration sound level" and press "Parameter" to adjust the output sound pressure level of the sound calibrator. Then move the cursor to the "Sensitivity level" of "Microphone No. 0", change the sensitivity level slightly (otherwise it cannot be saved by pressing the confirmation key), press the confirmation key and the message "OK" will appear.

When the adjustment is complete, press "Enter" key and the instrument will automatically save the result of the adjustment and display "OK" in the bottom right corner of the screen.

6.5.3 Calibration records

In the Calibration sub-menu interface, move the cursor to line 3 and press the "Enter" key to enter the calibration record list interface, which displays as the following:

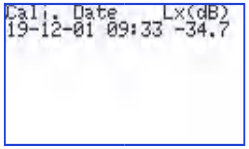


Fig.6-25 Calibration record list display

One line is a calibration record and one calibration record includes the date of the record and the microphone sensitivity level. If there are more calibration records, you can press the "Parameters" key to turn the page.

Press "Enter" and the instrument will prompt if you want to delete the calibration records, press "Enter" again to clear all calibration records.

6.6 Instrument Setup

In the main menu, use the "Cursor" key to move the cursor to "5. Instrument Setup" and press "Enter" to enter the Instrument Setup sub-menu, which displays as follows:

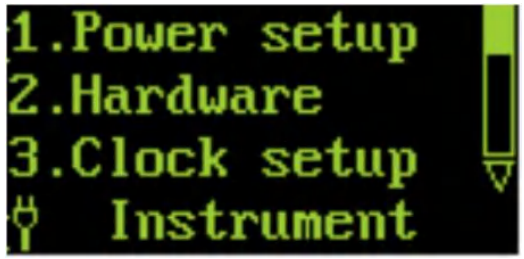


Fig.6-26 Instrument Setup sub-menu

6.6.1 Power Setup

On page 1 of the instrument setup, move the cursor to line 1 and press the "Enter" key to enter the “Timed Power On/Off”, the display will show the following:

Fig.6-27 Power Setup

Move the cursor to " Power On" or "Power Off" and press the "Parameter plus/minus" key to set the time of Power On/Off.

Fig.6-28 Timed Power On/Off

The cursor can be moved to the day, hour, minute and second and the corresponding day, hour, minute and second can be adjusted using the "parameter plus/minus" keys. When an item is set to the end "**" will be displayed (except for seconds) to indicate that this item is not involved in the comparison when timed Power on or off. This allows

for hourly and daily timed power on or off.It is recommended that timed on or off is used in conjunction with timed start measurement to allow automatic measurement.

6.6.2 Hardware Setup

On page 1 of the instrument setup, move the cursor to "2. Hardware Setup" and press "Enter" to enter the hardware setup interface, which displays as follows:

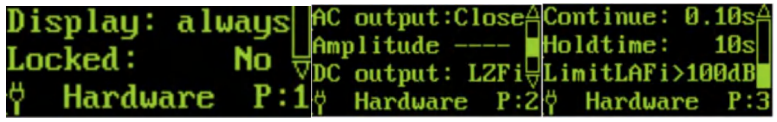


Fig.6-29 Hardware Setup

" Display ": Display protection. Can be selected between Normally Open, Delayed 10 s, 20 s, 30 s, 40 s, 50 s, 60 s, 70 s, 80 s, 90 s. 10 s to 90 s means that the display is automatically switched off if no key is operated within the specified time, Normally Open means that the display is always on.

"locked": Operation lock. If selected on, when the display is switched off automatically, the display can only be switched on again by pressing the "Parameter plus" and " Parameter minus" keys simultaneously. Then you can operate the instrument.

“AC Output”: “A”、“C”、“Z”、“1kHz” and “Off” are available. 1kHz means a fixed signal at 1kHz is output. "A", "C" and "Z" specify the AC signal at that frequency weighting.

"Amplitude": for AC outputs "A", "C" and "Z", the signal amplitude can be selected from 1x, 2x, 4x and 8x. When the frequency of AC output is "1 kHz", the output amplitude can be selected from "0.23 V", "0.5 V", "1 V ".

"DC output": outputs a DC signal proportional to the value of the specified indicator, which can be set in "LAFi", "LASi", " LAIi", "LCFi", "LCSi", "LCIi", "LZFi ", "LZSi", "LZIi", up to +3.1V DC output.

"Continue": The alarm is triggered only if the instantaneous noise value at all moments (0.02s interval) is greater than the

threshold value during the set duration time, and the +3.1V level is output at pin 4 of DB9.

"Holdtime": the time for which +3.1V is continuously output from pin 4 of DB9 after the alarm condition is reached, can be set from 0 s to 20 s.

"Limit": Set the measurement indicators and limits for the overrun determination, the measurement indicators can be set in "LAFi", "LASi", "LAIi","LZFi","LZSi","LZIi","LCFi", "LCSi", "LCIi". The criterions can be selected from 0 dB to 180 dB.

6.6.3 RTC Setup

On page 1 of the Instrument Setup, move the cursor to line 3 and press "Enter" to enter the RTC adjustment interface with the following display.

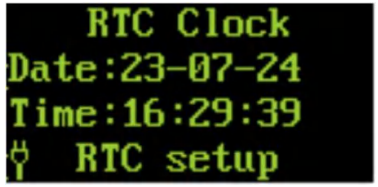


Fig.6-30 RTC Adjustment

The cursor can move to the date such as Year, Month, Day and time such as Hour, Minute, Second and use “Parameter plus/minus” key to adjust corresponding date and time. When the adjustment is complete press the "Enter" or "Exit" key to return to page 1 of the Instrument Setup.

With the cursor in "3. Clock Setup", press the right cursor key to go to page 2 of the Instrument Setup, as shown in the following:

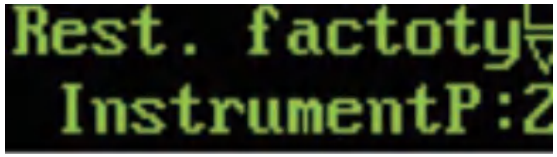


Fig.6-46 Page2 of Instrument Setup

6.6.4 Serial Port Setup

Move the cursor to "6. Serial port setting" and press "Enter", the instrument enters the serial port setting interface as shown below.

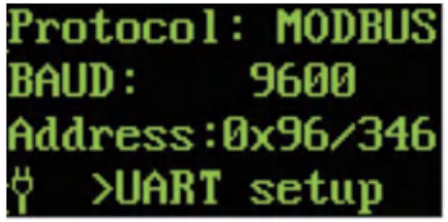


Fig.6-49 Serial Port Setup

"Communication Protocols": there is a protocol, "MODBUS".

"Device address": used for MODBUS communication, selectable between 0 and 255, "346" indicates the function code "03" for reading the parameter setup, "04" for reading the measurement results, "06" for writing the device address, baud rate, etc.

6.6.5 Other Setup

Move the cursor to "7. Other Setup" and press the "Enter" key to enter the other setup interface as shown below.

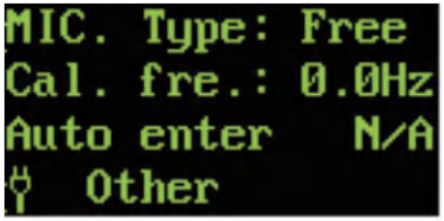


Fig.6-50 Other Setup

"Microphone": Available as " Free-field", " Diffuse-field" and automatic. The instrument is shipped with a free-field microphone. Some national standards require a diffuse field microphone, so this option can be set to 'Diffuse' and the instrument will automatically correct the high frequencies to achieve the required frequency response of a diffuse field microphone, see 'Appendix D' for the exact amount of correction. When placed vertically for automatic environmental noise monitoring, the field should be set up as a diffuse field, where the angle of incidence of the sound source is 90◦ .When Auto is selected, the instrument automatically adjusts the sound field type according to the orientation of the microphone. The instrument is a diffuse field type when placed vertically and a free field type when placed horizontally.

"Microphone": Available as " Free-field", " Diffuse-field" and automatic.The instrument is shipped with a free-field microphone.Some national standards require a diffuse field microphone, so this option can be set to 'Diffuse' and the instrument will automatically

correct the high frequencies to achieve the required frequency response of a diffuse field microphone, see 'Appendix D' for the exact amount of correction.When placed vertically for automatic environmental noise monitoring, the field should be set up as a diffuse field, where the angle of incidence of the sound source is 90◦ .When Auto is selected, the instrument automatically adjusts the sound field type according to the orientation of the microphone. The instrument is a diffuse field type when placed vertically and a free field type when placed horizontally.

" Internal calibration frequency ": "0Hz", "15.6Hz", "31.3Hz ","62.5Hz", "125Hz", "250Hz", "500Hz", "1kHz", "2kHz", "4kHz", "8kHz" are available. When 0Hz is selected, this means that internal calibration is not switched on. Selecting the frequency indicates that internal calibration is switched on and the measurement screen has a stable signal display with an upper limit of -1.4 dB in amplitude. This setting is used by the designer to verify the instrument's A, C, Z etc. frequency counting weights. It is not recommended for customers to use it in case they forget to cut back to 0 Hz."

"Automatic transfer of measurements":This function can be switched on at intervals of 1min to 10min, which is not available when the instrument is in other interfaces, and can reduce the risk of inadvertent failure to start measurements or upload real-time results. It is recommended that this function is switched on during online monitoring.

6.6.6 Restore Factory Setup

The cursor is on "8.", press the "Enter" key and the instrument prompts " Are you sure you want to restore?"

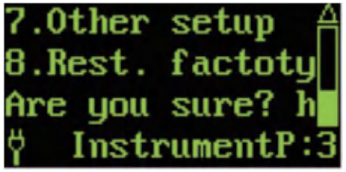


Fig.6-51 Restore Factory Setup

If the "Enter" button is pressed again, the instrument clears the measurement template, the measurement point name and the calibration record. The measurement setup are changed to the default values.

6.6.7 Language Setup

"Language": Move the cursor to "Language" and press "Enter" key to switch the language between "English", "Chinese" and "Português".

6.7 Instrument Information

In the main menu, use the "cursor" key to move the light to "6. Instrument information" and press the "Enter" key to enter the instrument information display sub-menu, which shows the following.

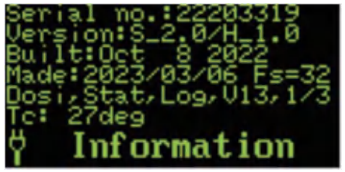


Fig.6-52 Instrument Information

"Serial no.22203319": The instrument number is 22203319.

"Version:S_2.0/H_1.0":

The instrument software version number is 2.0 and the hardware version is 1.0.

"Build:Oct 8 2022": The instrument software will be compiled on 8 October 2022.

"Made: 2023/03/06 Fs=32":

The instrument was manufactured on 8 October 2022 and has a sampling frequency of 32 kHz

"Tc: 27deg; ": Indicates that the internal temperature of the chip is 27 °C.

7 Method of Use

7.1 Before Use

1) Check if the condenser microphone and preamplifier are in place.

2) If necessary, the instrument should be calibrated using an acoustic calibrator.

3) The instrument should be sent to the metrology department for calibration at regular intervals (e.g. one year) to ensure the accuracy of the instrument.

4) When measuring in windy conditions a microphone windscreen can be used to reduce the effect of wind noise. Users can choose different windscreens.

7.2 Instruction of Use

There are several steps to take before the measurement: Use a fully charged battery or connect it to an external power supply, calibrate the instrument using a sound level calibrator and check if the instrument is working correctly.

7.2.1 Power supply

The instrument uses four 1.5V AAA batteries. When the battery voltage is below 3.6 V, the instrument will indicate undervoltage, and the battery should be replaced in a timely manner. If the measurement is in progress, the instrument will automatically save the measurement results and stop measuring. The instrument will automatically switch off when the battery voltage falls below 3.4V.

Note: The Measurement environment is normal temperature and pressure. The battery voltage at the undervoltage indicator point varies slightly at different temperatures, with the undervoltage point increasing at high temperatures and decreasing at low temperatures.

There is a USB interface at the bottom of the instrument, which can be powered by a matching adapter 5V/2A.

7.2.2 Instrument calibration

The instrument should be calibrated before each use. Use a sound level calibrator of class 1 or higher accuracy, place it over the Measurement condenser microphone, switch on the instrument, enter the measurement interface and display the Lp value, which should be ±0.3 dB of the output sound pressure level of the sound level calibrator.If this range is exceeded then the calibration interface should be accessed for acoustic calibration. For example, if the sound level calibrator has been calibrated to 93.9 dB, the LFp value on the instrument should be between 93.6 and 94.2 dB.If this

range is exceeded, press the "Exit" key to return to the main menu, then press the "Cursor left/right" key to move the cursor to "4. Press the "Enter" key to enter the calibration sub-menu. Use the "Cursor" key, move the cursor to line 1 and press the "Enter" key to enter the acoustic calibration interface. Put the acoustic calibrator on the microphone and switch on the acoustic calibrator, press the "Enter" key and the instrument starts the calibration process. A value from 1 to 9 is displayed in the lower right hand corner of the display and stops when 9 is displayed, indicating the end of calibration. Press "Enter" again to save the microphone sensitivity level and the calibration is completed.

Note: The instrument is calibrated to C-weighted sound pressure levels and no correction is required for calibrators with sounding frequencies between 200 Hz and 1.25 kHz; outside this range, calibration levels need to be adjusted according to the C-weighted frequency response.

8 Measuring range and self-generated noise

The measuring range of this instrument is mainly determined by the sensitivity of the microphone fitted. When the sensitivity of the microphone is high, both the upper and lower measurement limits are small, while when the sensitivity of the microphone is low, both the upper and lower measurement limits are large. The upper and lower measurement limits are displayed in the "Instrument calibration" menu. The upper measurement limit of the instrument can be estimated by the following formula:

Upper measurement limit = 106 - microphone sensitivity level (dB)

The upper measurement limit is the maximum A-weighted sound level that can be measured at 1 kHz, where the display just shows overload and the level linearity error is less than that required by IEC 61672-1:2013 for Class 1 instruments.

When the signal is not at 1 kHz, the upper measurement limits of the A and C levels are reduced. The table below shows the number of sound pressure levels to be reduced compared to 1kHz.

Table 8-1 Reduction in the upper limit of the A sound level measurement at different frequencies

Frequency(Hz)	16	31.5	63	125	250	500
Reduce (dB)	57	40	26	16	9	3
Frequency Hz)	2k	4k	8k	12.5k	16k	
Reduce (dB)	0	0	1	6	7	

Microphone preamp combination sensitivity level = $20*\lg\frac{S_M}{1000}$ (dB)

S_M---Sensitivity in mV/Pa. When the sensitivity of a microphone preamp combination is 20 mV/Pa, the sensitivity level is approximately -34.0 dB (the sensitivity level is generally negative).

After the sensitivity level of the instrument has been determined, the lower measurement limit of the instrument is mainly determined by the self-generated noise of the instrument. Self-generated noise is the sound pressure level displayed on an instrument when it is placed in an environment where the sound pressure level is

sufficiently low. The electrical noise of the instrument is the highest self-generated noise level displayed on the instrument when the microphone is replaced by an electrical input device and the input is short-circuited.

Table 8-2 Self-Generated Noise of the instrument

Frequency weighting	A	Remarks
Self-Generated Noise(dB)	<20.0	
The electrical noise of the instrument(dB)	<14	20 pF (Fitter)

9 Overload and Under-range Indication

When the measured noise exceeds the measurement range of the instrument, the overload indicator flashes for as long as the overload condition exists, and for a minimum of 1 s.If an overload occurs during a measurement, an overload symbol "⊗" will be displayed at the bottom right of the instrument and the overload indication will remain until the next measurement is started or the current measurement result is cleared.The overload indication is a judgement of the peak value of the signal. When the peak factor of the signal is relatively large, the instrument shows a sound pressure level that is less than the upper measurement limit, but there is a possibility of overload.When the measured noise is below the lower measurement limit of the instrument, an under-range symbol "↓" is displayed at the bottom right of the

instrument is displayed for as long as the under-range condition exists, and for a minimum of 1 s.

10 Effects of static electricity, radio frequency and vibration

The instrument will not be damaged after a temporary reduction in performance following a contact discharge of up to 4 kV electrostatic voltage and an air discharge of up to 8 kV electrostatic voltage, and will not cause any change or loss of stored data. The effect of the work frequency field on the instrument is minimal and can usually be ignored. When the instrument is exposed to an RF field, it will affect the lower measurement limit of the instrument. This instrument is sensitive to RF in category X. When using it in an RF field, do not use extension cords and do not get too close to RF sources such as mobile phones.

11 Information specified for metric purpose

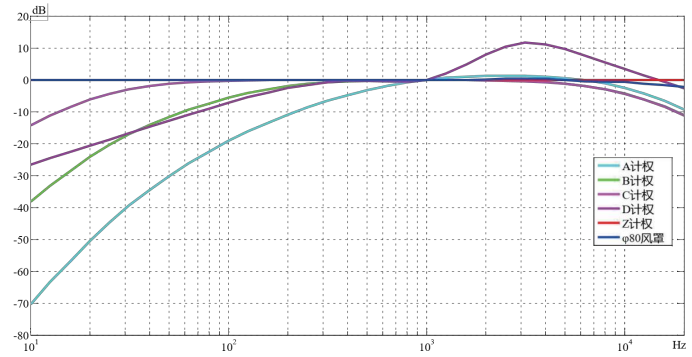
1) Reference Sound Pressure Level: 94.0 dB
2) Direction of reference incidence: Axial direction of the microphone
3) Microphone reference point: Centre of the microphone diaphragm
4) Correction data from sound pressure response to free field response (reference incidence direction)

Frequency (Hz)	1k	1.25k	1.6k	2k	2.5k	3.15k	4k
Correction value (dB)	0.15	0.2	0.3	0.4	0.6	0.8	1.2
Frequency (Hz)	5k	6.3k	8k	10k	12.5k	16k	20k
Correction value (dB)	1.75	2.45	3.7	5.5	7.3	8.1	10.5

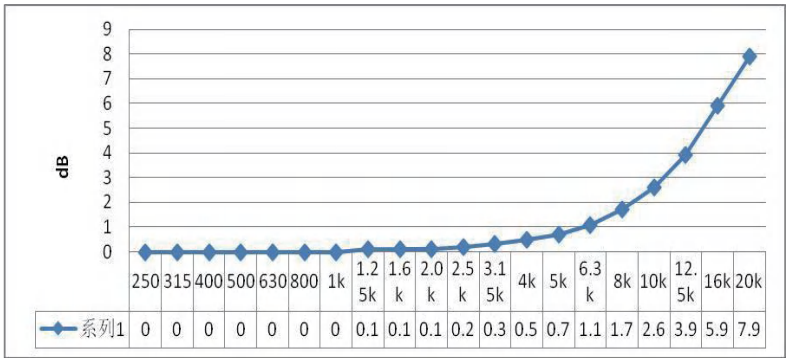
5) The nominal free-field response of the instrument in the reference direction under approximate reference environmental conditions, see Appendix B.
6) Electrical input devices:Instead of a microphone, the electrical signal can be Measuremented with an equivalent electrical impedance with a capacitance of 20 pF and an insulation resistance of more than 1 GΩ. A shielded cartridge with the equivalent electrical impedance is screwed onto the preamplifier.
7) Maximum background noise: The highest possible native noise is 20 dBA when the instrument is placed in a low sound level sound field and when the microphone is replaced by the above-mentioned fitter and short-circuited.
8) Maximum permissible sound pressure level on the microphone: 146 dB
9) Maximum peak input voltage for electrical input devices: 7 Vp
10) Operating voltage range when the instrument meets the technical requirements: DC4.5 V ~ DC8.0 V
11) The typical time required to reach stability after a change in environmental conditions is at least 12 h under reference environmental conditions and at least 19 h under other environmental conditions.

Appendix A:

Nominal Free-field response in the reference direction

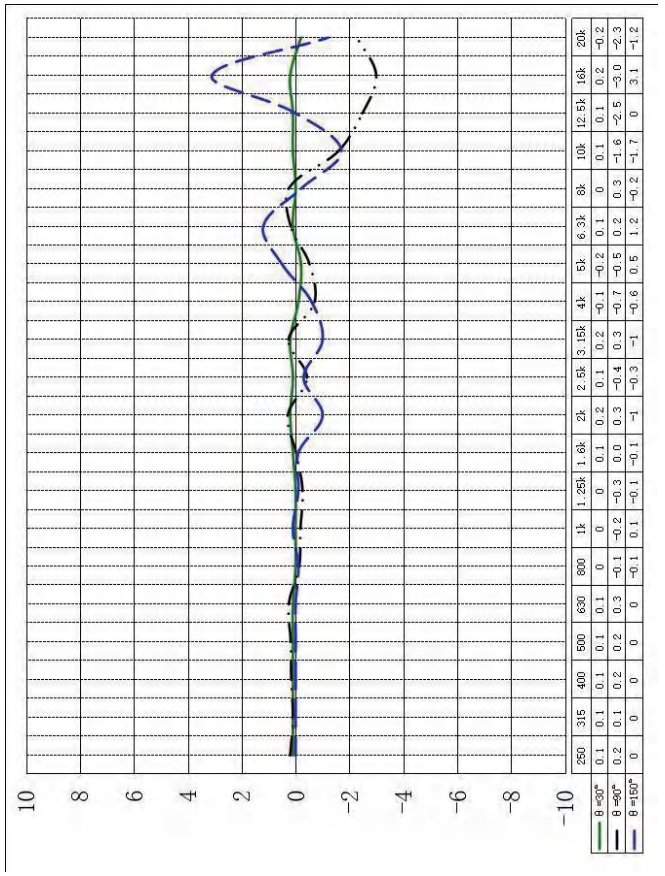


Z-weighted response when choosing a diffusion field for microphone type



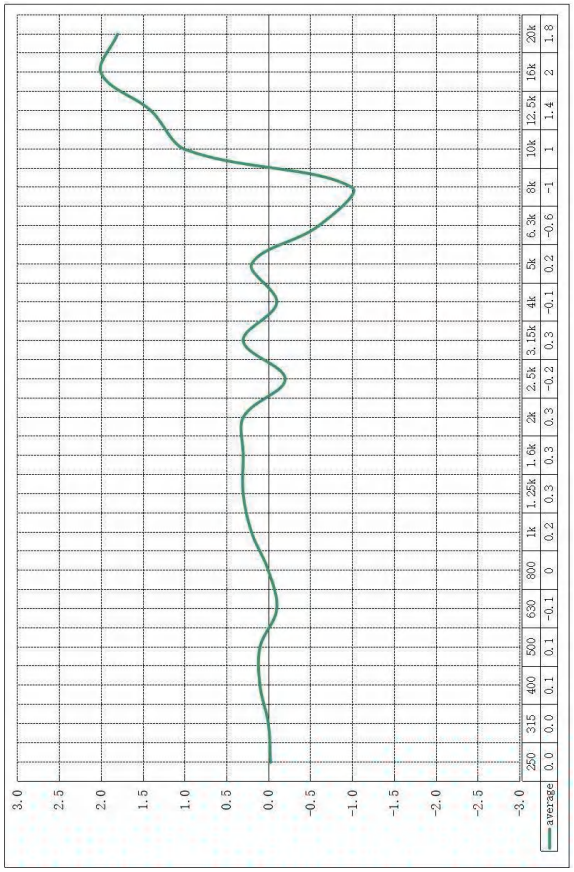
Appendix B:

Directional response relative to reference direction



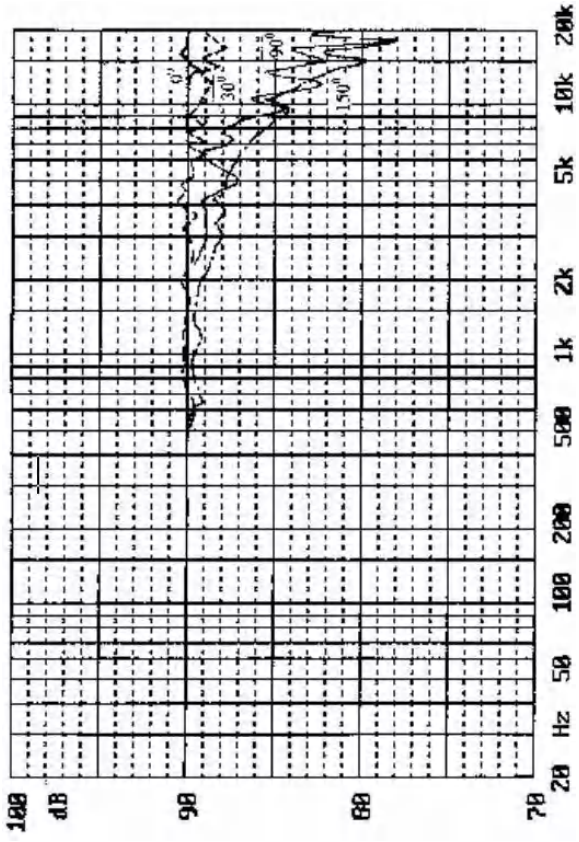
Appendix C:

Average nominal free-field response of the windscreen in the absence of wind



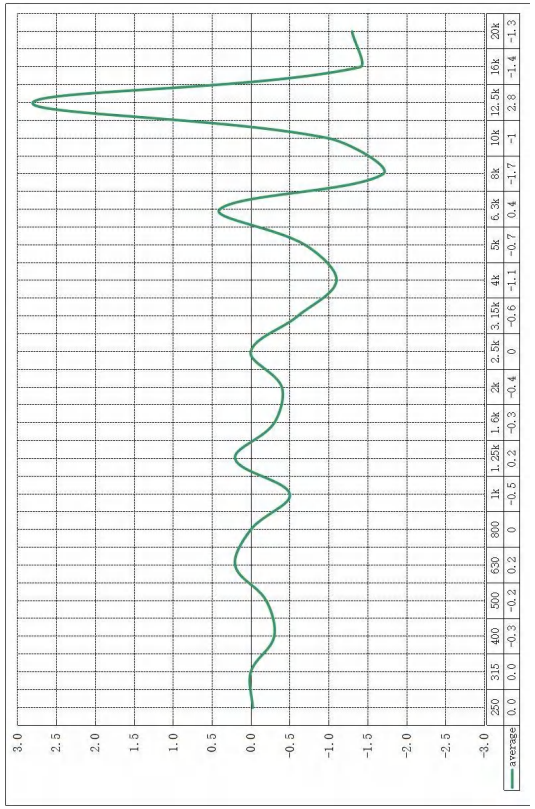
Appendix D:

Relative Directivity Response of Microphones



Appendix E:

Typical effects of reflections from the instrument housing and diffraction around the microphone under approximate reference environmental conditions



Appendix F:

AC Output and PWM Output Reference Tables

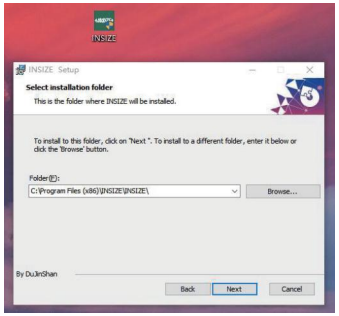
Input signal	Output signal (Input signal: 1kHz sine signal)		PWM output (Positive Duty Cycle, 2kHz)
141 dB	775	1X Enlarge	100.0%
140 dB	691		99.9%
130 dB	218.6		92.8%
120 dB	70.1		85.5%
	553.7	8X Enlarge	
110 dB	177.1		78.5%
100 dB	56.0		71.4%
90 dB	17.7		64.2%
80 dB	5.6		57.1%
70 dB	1.78		49.9%
60 dB	0.57		42.8%
50 dB	/		35.7%
40 dB	/		28.5%
30 dB	/		21.3%

Note: The AC output is related to the sensitivity level of the instrument, the table above is measured at a sensitivity level of -35.0dB.

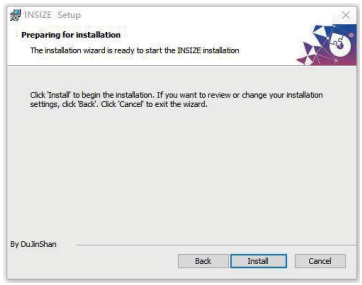
Software

1 Software installation (do not install on C drive)

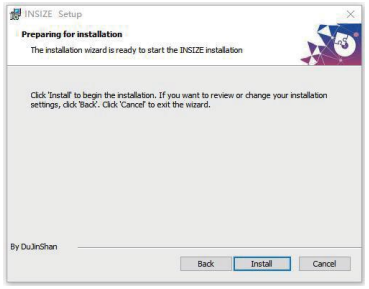
Open the software installation in the standard USB drive, and the steps are as follows:



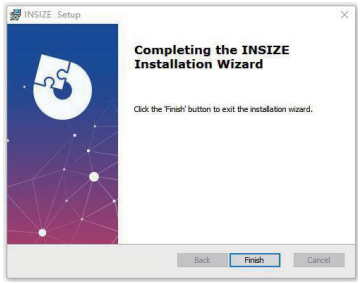
I



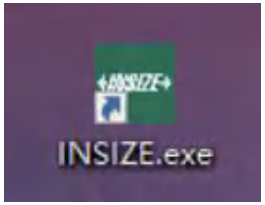
II



III



IV



(Shortcut Icon)

2 Connection with PC

Connect the standard TYPE C data cable to the computer software, and the computer can power the device through the TYPE C cable.

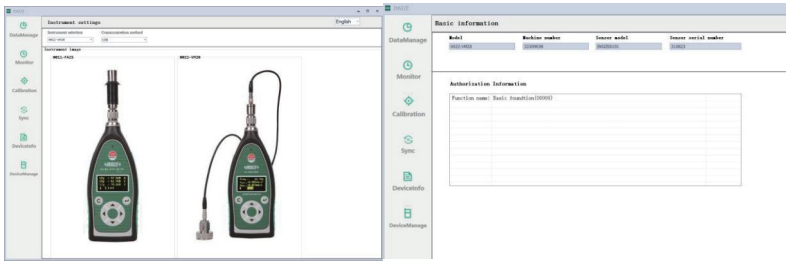
3 Software Settings

3.1 Language settings

After successfully installing the software, open the software and display the English interface. If you need to change it to Chinese, you can click on the position in the following image to switch languages.

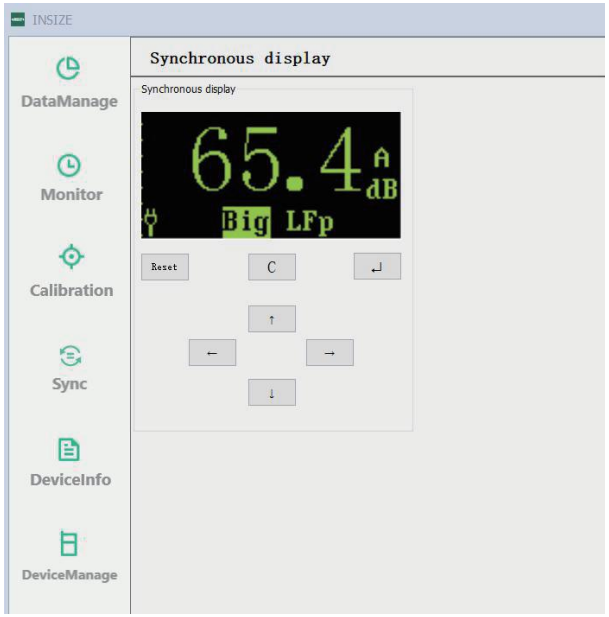
3.2 Instrument management and equipment information

Select the corresponding equipment model for the instrument to establish a connection, select 0022-VM20 for the vibration meter, and 0011-FA25 for the sound level meter. After selecting the correct device model and clicking on Basic Information, the interface will display the model and body number of the host, as well as the model and body number of the sensor.



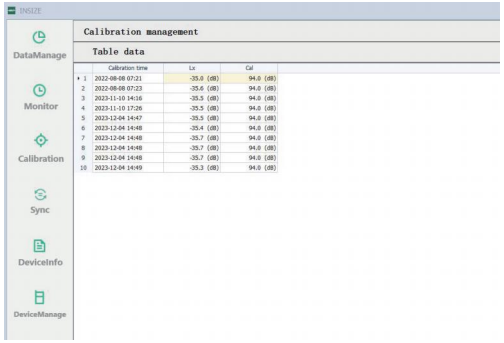
3.3 Synchronous display

The synchronous display interface synchronizes the device display screen and has the same buttons on the device.



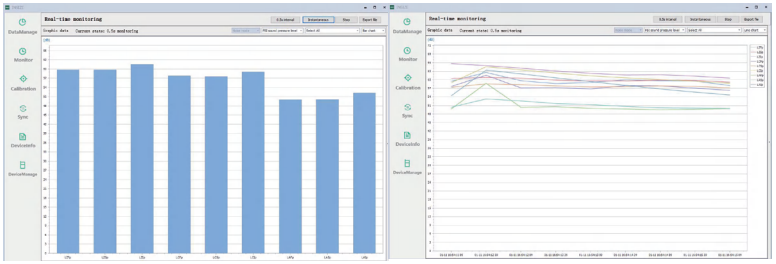
3.4 Calibration Management

The calibration management interface allows for querying and exporting calibration records.



3.5 Real time monitoring

The real-time monitoring interface can be turned on or off, and monitoring modes can be set: bar chart and line chart. After real-time monitoring is stopped, monitoring data can be exported.



Time	LZFp (dB)	LZSp (dB)	LZIp (dB)	LCFp (dB)	LCSp (dB)	LCIp (dB)	LAFp (dB)	LASp (dB)	LAIp (dB)
01-11 16:53:44.39	61.7	60.5	64.3	60.1	58.6	62.5	57.4	53.8	61.2
01-11 16:53:44.89	62.1	60.7	65.8	61.3	59.2	65.5	59	54.8	63.2
01-11 16:53:45.39	62.2	61.5	66.4	61.1	59.4	65.5	57.5	56.8	63.7
01-11 16:53:45.89	61	61.3	65.3	59	59.9	64.4	53.8	55.9	62.4
01-11 16:53:46.39	60.6	61	64.5	58.1	59.3	63.4	50	54.4	61.1
01-11 16:53:46.89	59.6	60.4	63.5	58.1	58.8	62.4	50.8	53.3	59.8
01-11 16:53:47.39	58.5	59.8	62.6	57.1	58.2	61.4	51.4	52.6	58.5
01-11 16:53:47.89	62.8	61.2	67.1	61.1	59.6	66.7	58.3	56.2	66.3
01-11 16:53:48.39	60.7	61	66.1	58.2	59.2	65.5	50.5	54.7	64.9
01-11 16:53:48.89	59.3	60.4	64.9	57.8	58.6	64.2	50.7	53.3	63.4
01-11 16:53:49.39	57.8	59.7	63.8	56.3	57.9	63	49.9	52.3	62
01-11 16:53:49.89	60.2	59.6	62.9	57.7	57.6	62	51.4	51.7	60.6
01-11 16:53:50.39	59.9	59.7	62.3	57.6	57.6	61.1	49.7	51.2	59.4
01-11 16:53:50.89	58.7	59.6	61.6	57.2	57.6	60.4	49.5	50.7	58.1
01-11 16:53:51.39	59	59.3	61.2	57	57.4	59.6	49.9	50.3	56.9
01-11 16:53:51.89	59.1	59	60.5	57.5	57.2	59	52.2	50.7	55.8
01-11 16:53:52.39	59.5	59.5	63.3	57.7	57.5	61	52.2	51.9	58.4
01-11 16:53:52.89	60.4	59.7	62.5	58.8	57.8	60.6	53.7	52.1	57.3
01-11 16:53:53.39	59.8	59.9	62.8	57.5	57.8	60	49.9	51.3	56.1
01-11 16:53:53.89	59.1	59.4	61.9	57.5	57.6	59.4	51.9	51.2	55.1
01-11 16:53:54.39	59.6	59.5	61.6	57.8	57.7	60	52.2	52.1	57.7
01-11 16:53:54.89	61.3	60.1	63.8	58.6	57.9	59.7	52.1	51.7	56.5
01-11 16:53:55.39	60.6	60.2	63	58.1	57.9	59.2	50.2	51.1	55.4
01-11 16:53:55.89	60	59.9	62.3	56.8	57.6	58.7	49.8	50.6	54.4
01-11 16:53:56.39	59.2	59.6	61.7	56.9	57.3	58.4	50.3	50.3	53.5
01-11 16:53:56.89	59.9	59.9	62.7	57.3	57.2	58.6	50	50.5	53.7
01-11 16:53:57.39	59.4	59.8	62	57.5	57.4	59.2	49.6	50.2	52.9

3.6 Data management

The test data and operation records stored in the 0011-FA25 sound level meter can be read by software and exported in excel format.