CENTER® 324

SOUND MEASURING RECORDING SYSTEM

CE

Instruction Manual

SE-324

CONTENTS

Title Page

1. SAFETY INFORMATION……..……..……..1
2. GENERAL DESCRIPTION ……..……...….1
3. FEATURE ……..... 1
4. SPECIFICATIONS ..……..……....2
5. NAME AND FUNCTIONS ..…….....3
Display screen……4
6. DATA LOGGER & INTERVAL SETUP…….…..7
6.1 Turn On or Off Recording Function..…...…….....7
6.2 Clearing Stored Data …….……8
7. SETTING THE DATE AND TIME…… 9
8. CALIBRATION PROCEDURES…….……10
9. MEASUREMENT PREPARATION…….……..... 10
10. OPERATING PRECAUTIONS……11
11. MEASUREMENT…….……..11
12. SETUP SE-324……..….....12

1. SAFETY INFORMATION

Read the following safety information carefully before attempting to operate or service the meter.

Use the meter only as specified in this manual; otherwise, the protection provided by the meter may be impaired.

Environment conditions

- Altitude up to 2000 meters
- Relatively humidity 90% max.
- Operation Ambient 0 ~ 40°C

Maintenance & Clearing

- Repairs or servicing not covered in this manual should only be performed by qualified personnel.
- Periodically wipe the case with a dry cloth. Do not use abrasives or solvents on this instrument.

Safety symbols

CE **Comply with EMC**

When servicing, use only specified replacement parts.

2. GENERAL DESCRIPTION

Thank you for using our SOUND MEASURING RECORDING SYSTEM. To ensure that you can get the most from it, we recommend that you read and follow the manual carefully before use.

Measurement settings and results (level values and bar graph) are shown on the backlit LCD panel.

Data can be stored in the meter or directly saved on a computer through USB interface. Recorded data can be further processed on a computer.

3. FEATURE

- Sound recording function
- Internal 128,000 records data logger
- Micro SDHC for sound recording up to 32GB
- PC software to synchronize sound and SPL data for analysis
- USB Interface / Tripod compatible

4. SPECIFICATIONS

Standard applied: IEC 61672-1 Class 2, ANSI S1.4 Type2.
Frequency range: 20Hz ~ 8KHz
Measuring level range: 30 ~ 130dB
Frequency weighting: A / C
Microphone: 1/2 inch electret condenser microphone
Display: Liquid Crystal Display
Digital display: 4 digits
Resolution: 0.1dB
Display Update: 0.5 sec.
Analog display: 30 segment bargraph
Resolution: 2dB
Display Update: 50 mS
Time weighting: FAST , SLOW
Level ranges: Lo : 30 – 90 dB
Med : 50 – 110 dB
Hi : 70 – 130 dB
Auto : 30 – 130 dB
Accuracy: ±1.0dB (under reference conditions @ 94dB, 1KHz)
Dynamic range: 60 dB
Alarm function: “OVER” is when input is more than upper limit of range.
“ UNDER ” is when input is less than lower limit of range.
Data logging Capacity: 128,000 records
AC output: 1 Vrms at FS (full scale)
(**FS**：means the upper limit of each level range.)
DC output: 10mV / dB
Power supply: 4 AAA, NEDA 24A, IEC LR03 batteries
Power life:
About 20 hrs (alkaline battery); about 5 hrs (Sound Recording ON)
Power consumption: Approx. 0.2W
External power supply: 5 VDC (micro USB plug)
Operation temperature: 0 to 40°C (32 to 104°F)
Operation humidity: 10 to 90%RH
Storage temperature: -10 to 60°C (14 to 140°F)
Storage humidity: 10 to 75%RH

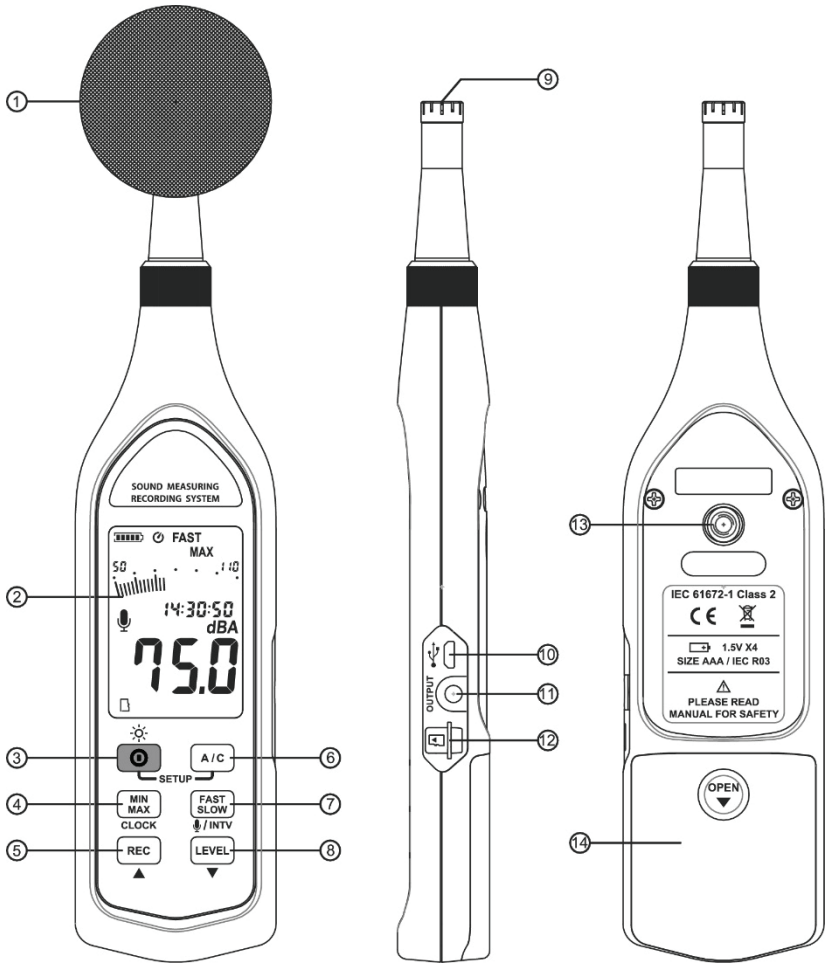
Dimensions: 270(L)x63(W)x29(H)mm; 10.6(L)x2.5(W)x1.1(H)inch

Weight: 305g (including battery)

Accessories: 1.5V battery X 4 pcs, carrying case, instruction manual, micro SDHC card，USB cable, windscreen, 3.5ϕ plug, software.

Option: Microphone Extension Cables (5m or 10m length).

5. NAME AND FUNCTIONS



Display Screen:

SYMBOL	***FUNCTION***
	Battery capacity indicator
	Auto power off indicator
MIN MAX	Maximum/Minimum indicator
FAST SLOW	Time weighting indicator
30—130	Level range indicator
	Bar graph
88:88:88	Time
	Sound Record ON indicator
dBA/dBC	Frequency weighting indicator
188.8	Level reading
88-88-88	Date
OVER	Over-range signal indicator
	microSD card is inserted
	microSD card is not inserted
FULL	microSD card is full
FULL	Memory full
REC	Recording datalogger indicator
UNDER	Under-range signal indicator

① Windscreen:

When making outdoor measurements in windy weather or when measuring air conditioning equipment or similar, wind noise at the microphone can cause measurement errors. Such effects can be reduced by using the windscreen.

② Display screen.

③ Power button:

Press the button to turn the meter on. To turn the unit off, press and hold button down until the screen shows " **OFF 3, 2, 1,**" then the LCD screen goes off.

- **LCD backlight on/off:**

Press to turn on the LCD backlight. This makes it easier to read in dark environment. Press again to turn off backlight. The meter can also turn the backlight off automatically after 30 seconds to save battery power.

- **Auto power off.**

To save battery life, by default, when the unit is powered on, it is under auto power off mode.

The unit will power itself off after 30 minutes if no key operation.

Auto power off will be disable under the following 2 circumstances.

(1) When connecting to PC.

(2) When recording function is on process.

- **Disabled auto power off.**

One may press and hold FAST SLOW button and then power on the meter and the will not show up to indicate that auto power off is disable.

Note: When the user powers it on, the LCD will show how much internal memory space is available to use.

④ MIN MAX MAX/MIN button:

Press button to enter the maximum and minimum recording mode.

Under this mode, the maximum value and minimum value will be stored and automatically updated in the memory simultaneously.

Pressing the MIN MAX button will display the "MAX" symbol and the maximum value on the display. Pressing MIN MAX button again will display the " MIN "

symbol indicator and the minimum value on the display.

Pressing [MIN MAX] button again will cause the maximum and minimum indicators to blink together. Which means the meter is under maximum and minimum recording mode. The value displays on the screen is the present value.

To exit the maximum and minimum mode, press and hold [MIN MAX] button down until the " MAXMIN " symbol is disappeared.

⑤ [REC] REC button:

When pressing the button, the unit will start recording, and the " REC " symbol display. To stop recording press again [REC] button.

⑥ [A / C] A/C button:

Sets frequency weighting to A or C.

⑦ [FAST SLOW] FAST/SLOW button:

Sets the time weighting to Fast or Slow.

⑧ [LEVEL] Range control button:

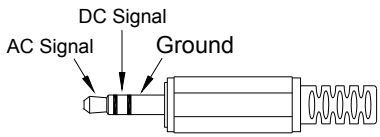
Each time you press [LEVEL] button, the level range will change between "**Lo**" level, "**Med**" level, "**Hi**" level and "**Auto**" level in the circular.

⑨ Microphone:

1/2 inch Electret Condenser microphone.

⑩ USB Interface

Connection to a Computer or external power supply intput.



⑪ AC/DC signal output jack:

AC：1 Vrms Corresponding to each range step. (with frequency weighting)

Output impedance ≒ 100Ω

Output signal by standard 3.5mm coaxial socket signal on pin.

Note: At "Auto" level range, output signal is Auto select on "Lo" or "Med" or "Hi" level range.

DC: Output: 10mV/dB

⑫ microSD card slot

Note: Turn off the meter before inserting or removing SD card.

Format MicroSDHC card on a PC before using, only accept FAT32 file format.

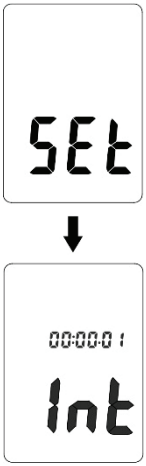
⑬ Tripod mounting thread:

For long-term measurements, the unit can be mounted on a camera tripod. Proceed carefully, to avoid dropping the unit.

⑭ Battery compartment.

6. DATA LOGGER & INTERVAL SETUP

How to store data in memory?
Setup data logging interval:



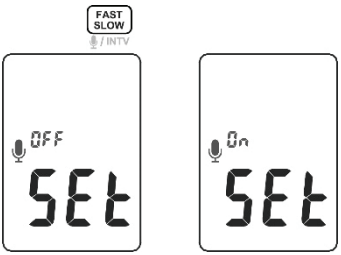
(1) Press and hold "A / C" button and then power on the meter.

(2) Press **INTV**(FAST SLOW) button, " **Int** " appears for interval, as well as a flashing second display.

(3) Now set the desired recording interval in minutes and seconds. Press ▲(REC) or ▼(LEVEL) to increase or decrease number, Max 1 minute can be set. The minimum value is limited to "00:01"(=1s). After setting has been performed, actuate the press **INTV**(FAST SLOW) button once, to get back to the display of the instantaneously measured values. If you want abort during a setup process, press button to cancel.

6.1 Turn On or Off Recording Function:

(1) When pressing the REC button to start data logging, the meter will ask whether to simultaneously record sound.



(2) Press 🎤 (FAST SLOW) button to select whether to activate the sound recording function.

(3) Press REC button again to start data logging. The sound level values are stored in a built-in memory. Press REC button again to stop recording.

(4) Audio files (*.wav) are stored in the microSDHC card and must be downloaded via computer.

Note:

(1) During recording period, most of the buttons such as the A / C, FAST SLOW, LEVEL are inoperative. All other settings must be made before starting the record operation.

(2) Do not use PC linking during data recording process which might cause data and reading error.

(3) Any of the following 3 states will automatically stop recording, **REC** symbol will disappear.

(a) Battery power is low:

The battery indicator " ▮▮▮▮▮ " shows the remaining battery power. The number of black bar decreases as the battery running out. When the power is almost empty, " ▭ " will disappear. Press REC button, LCD display will show " **Lo bat** " warning indication. If the meter is under record mode, it will stop.

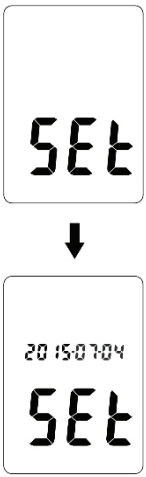
(b) The internal memory is full.

(c) SD card is full.

6.2 Clearing Stored Data :

If you want to clear the memory, power off the unit, then press and hold REC button and then press ⏻ button and hold at least 5 seconds, then LCD will show "**CLr**" and "**SURE**" to clear the memory.

7. SETTING THE DATE AND TIME



The unit incorporates a clock so that the data logger function can also record the data and time along with the measurement value in the memory.

(1) Turn off the unit.

(2) Enter SETUP mode by pressing and holding [A/C] button and then press [⏻] power button to turn on the unit. "**SEt** " blinks on the LCD screen.

(3) Press **CLOCK**([MIN MAX]) button to set clock.

(4) Press ▲ ([REC]) or ▼ ([LEVEL]) to adjust year, press **CLOCK**([MIN MAX]) button to adjust next value (month →date→hour→minute→second).

(5) When finish, press **CLOCK**([MIN MAX]) button to exit SETUP mode.

Note:

(1) To abort during the process, press power button to exit SETUP mode.

(2) An internal rechargeable backup battery keeps the clock of the unit running when the power is turned off the backup battery is recharged by the main batteries. The clock will keep running for 3 months on the backup battery alone. If the unit is not to be used for an extended period, the main batteries should be taken out to prevent possible damage due to battery fluid leakage. After reinserting the batteries, be sure to set the date and time.

8. CALIBRATION PROCEDURES

(1) Press and hold MIN MAX button and then power on the meter, LCD display "**CAL 94db**" symbol.

(2) Insert the microphone housing carefully into the insertion hole of the calibrator.

(3) Press ▲(REC) or ▼(LEVEL) button to increase or decrease number.

(4) Press MIN MAX button to finish. If you want abort during a setup process, press power button to cancel.

※ Our products are all well calibrated before shipment. Recommended Recalibration cycle: 1 year.

9. MEASUREMENT PREPARATION

(1) Battery Loading:

Remove the battery cover on the back and put in four (1.5V,size AAA) batteries, paying attention to the polarity as indicated in the compartment.

Note:

It is possible to use size AAA rechargeable batteries, but a separate charger must be provided for such batteries, since the unit is not designed to recharge batteries.

(2) Battery capacity indicator:

When operating the unit on batteries, periodically check this indicator to determine the remaining battery capacity.

(3) External power supply:

When the 5Vdc Mobile power is used, insert the plugs of the Mobile power into the micro USB connector.

Note: When the Mobile power is connected, the unit will be powered form the Mobile power, also when batteries are inserted.(The Mobile power has priority)

10. OPERATING PRECAUTIONS

(1) Wind blowing across the microphone would bring additional extraneous noise. When using the instrument in the presence of wind, it is a must to mount the windscreen to not pick up undesirable signals.

(2) Calibrate the instrument before operation if the instrument was not in use for a long time or operated in bad environment.

(3) Do not store or operate the instrument at high temperature and high humidity environment.

(4) Keep microphone dry and avoid severe vibration.

(5) Please take out the battery and keep the instrument in low humidity environment when not in use.

11. MEASUREMENT

(1) Turn power on and select the desired response Time and frequency Weighting. If the sound source consists of short bursts or only catching sound peak, set response to FAST. To measure average sound level, use the SLOW setting. Select A-weighting for general noise sound level and C-weighting for measuring sound level of acoustic material.

(2) Hold the instrument comfortably in hand or fix on tripod and point the

microphone at the suspected noise source, the sound pressure level will be displayed.

(3) When MAX MIN (maximum, minimum hold) mode is chosen. The instrument captures and holds the maximum and minimum noise level for a long period using any of the time weightings.

Press the [MIN MAX] button 2 seconds to clear the maximum and minimum reading, "MAX MIN" symbol disappears.

12. SETUP SE-324 (Sound Level Meter)—USB interface software:

- **The SE-324 package contains:**
  1. Installation CD.
  2. Micro USB cable .
- **System Required:**
  Microsoft Windows 7/ 8/10 (compatible with 32 and 64-bit system).
- **Minimum Hardware Required:**
  PC or NoteBook with CD-ROM ;
  At least 50 MB byte hard disk space available to install SE324.

Install SE-324:

(1) Insert setup CD disk to CD disk drive, Windows will run the setup.exe automatically.

(2) If the Windows fail to run the setup.exe automatically, choose the Start button on the Taskbar and select Run. Type E:\SETUP and choose OK.

(3) Follow the instruction to finish the installation.

(4) It will copy SE324.exe (executable file) and help file to your hard disk (default is c:\program files\SE324).

For detailed other operation instruction, please refer to the online help while executing SE324.

Main Menu:

File |

Open- Retrieve files

Save- Save the active window (when the caption bar is highlighted) data

to file.

Print- Print the graph of the active window.

Printer Setup- Select printer.

File | Exit: Terminates SE324 program.

Real Time Data |

Run- Start collecting real time data

Stop- Stop collecting real time data.

DataLogger |

Load Data- By opening the DataLogger Window, the user can load recorded data of meter to PC in this window.

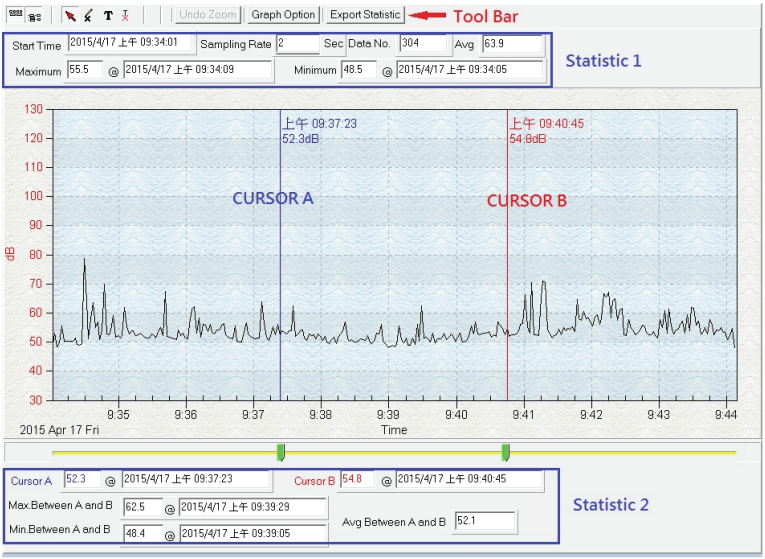
Erase Memory- Erase the memory on the Sound Level Meter. All the stored data will be erased.

LEQ | Open the LEQ function window.

View | Control Panel: By opening the Panel Window, the user can control meter via the button in this window.

View | Real-Time Graph: Open Real-Time Graph display to graph the present data.

Graph



Tool Bar

- Display or hide Statistic1.
- Display or hide Statistic2.
- Normal cursor.
- When selected, the mouse cursor will become a cross sign when moving to the graph, click on the graph to mark a cross sign on the graph.
- When selected, the mouse cursor will become a "I" sign when moving to the graph, click on the graph to annotate.

You can choose a rectangle area on the graph to zoom in for detail.
There are two vertical line (CURSOR A and CURSOR B) in the graph. There are time and value display on top and right side of each cursor. You can move mouse cursor over cursor A or B and click to drag cursor to move left or right. Right below cursor A and B is a slider. You can also click and drag slider to move cursor A or B. Below the slider is the statistic, it displays start time, sampling rate, data number, maximum and minimum of the graph. The statistic also displays the maximum, minimum and average between cursor A and B and these data will update automatically when cursor A or B is moving.

You can double click the graph to call the option dialog. In option dialog, it is allowed to customize your graph style.

You can Zoom this graph by using mouse:

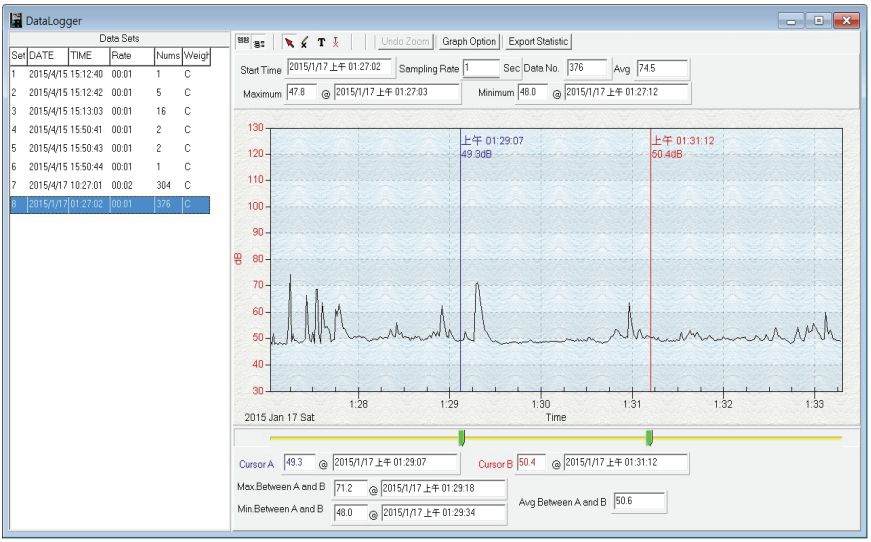
To Zoom:

(1) Press the left mouse button and drag the cursor to select the new extents.

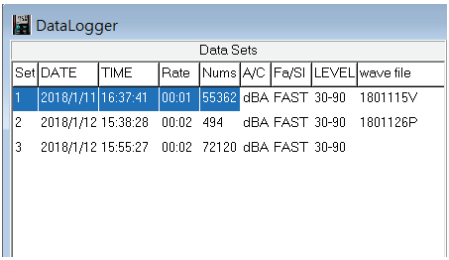
(2) Release the mouse button.

To Undo the Zoom - Right click on the graph, there will be a pop-up menu, select Undo Zoom.

DataLogger



for examples:



When you have Sound Level DATA LOGGER meter connected to PC and select "DataLogger" from main menu or click from tool bar to load recorded data from the meter and there will be a progress indicator to show the loading progress, if error occurs, just click "DataLogger" again.

After the data was loaded, the left hand side will show how many data sets were loaded and detail information for each data set (start data, start time, recording rate and record numbers).

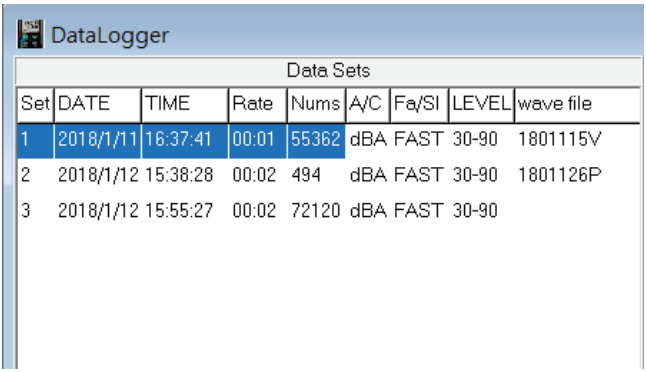
It will transfer first data set to graph and tabular on the right hand side every time after you load recorded data from the Sound Level Meter and you can click at any data set to change the set for graph.
On the right hand side sets the waveform graph and statistic information of the data set you choose as refer to the graph.

To play recording sound:

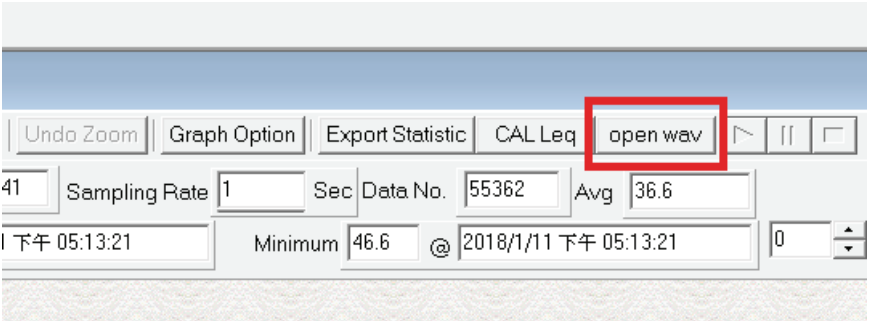
First take the SD card out and connect to the card reader on PC.

Read out the measuring data from the meter to PC using Datalogger program. If the recording wave is available, its file name will be shown at the last column on the data sets information table. The sound file is arranged in less than 30 minutes package. If the recording period is longer that 30 minutes, several files will be created.

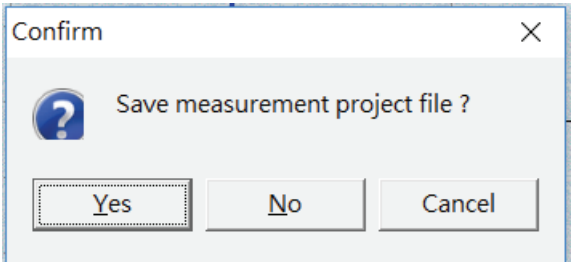
Click on the open wav button and the user should point the destination to the SD card directory and choose the correct file. The user only has to point out the first wave file and the rest files will be collected automatically.



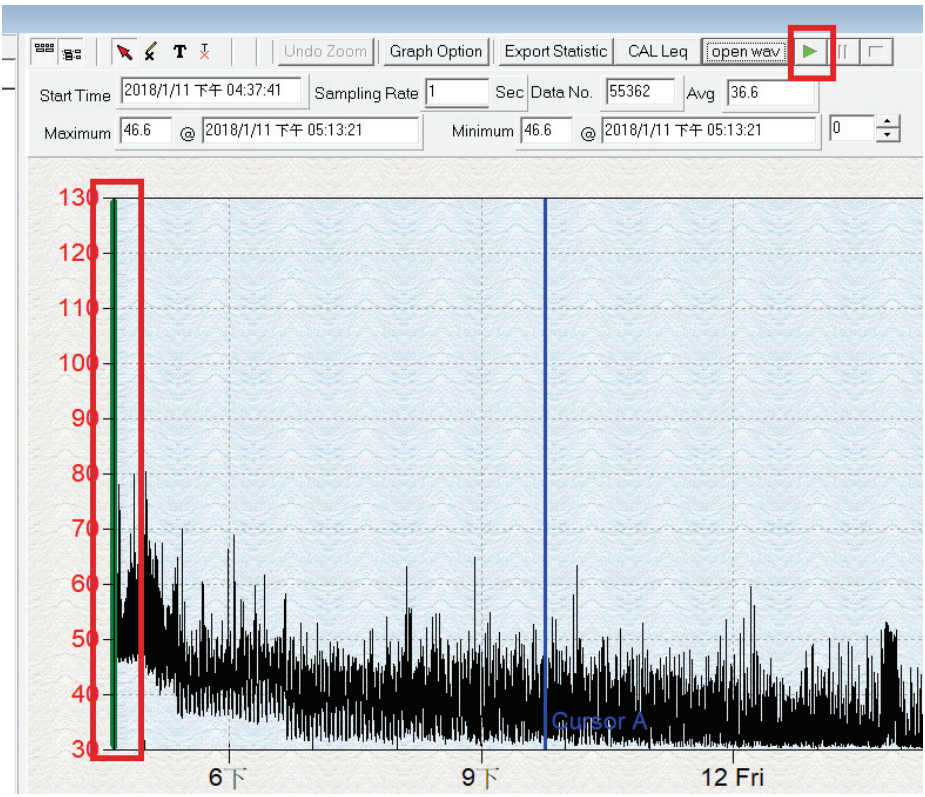
Press “open wav”



After the wave file is acquired, the program will ask whether the user wants the collect all files into one project directory for future use.



To start the playback, you can click and hold on the green line, then move to where you want to start to play , after that, click on the play button by the open wav button. Green line will indicate the relationship of the data and sound currently been played.



Tutorial - Quick Start to Use SE324:

(1) Recording real time data in waveform.

(a) Power on the Sound Level Meter first and connect it to a PC USB port with the cable.

(b) Start SE324 program.

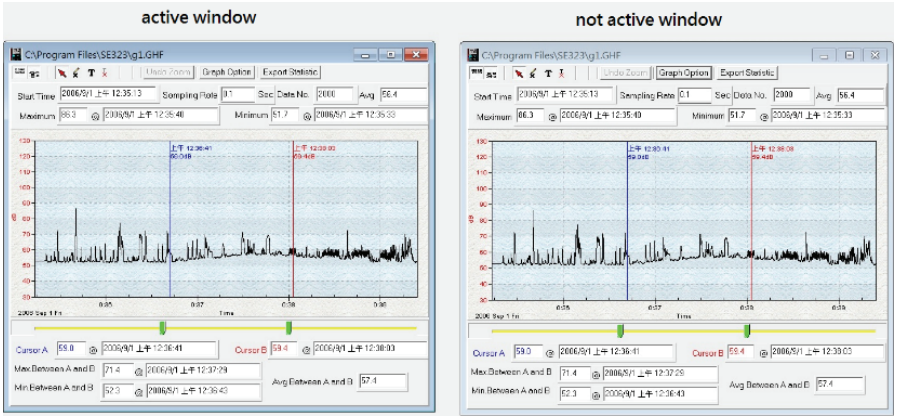
(c) If the connection is successful, the panel will display the same value as the Sound Level Meter. If fail to connect the meter with PC, it will display "No Connection" on the panel window in SE324.

(d) When the connection is successful, click to start recording real time data and there will be a waveform on the Real Time Graph Window.

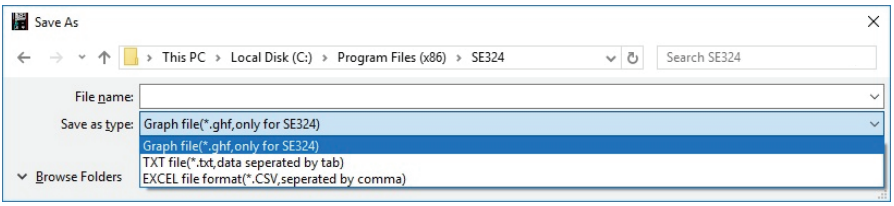
(e) Click to stop recording.

(2) How to save the recorded real time data to a file?

(a) Click the graph window you want to save and the graph window will become active, then choose File | Save from main menu or click from the tool bar.

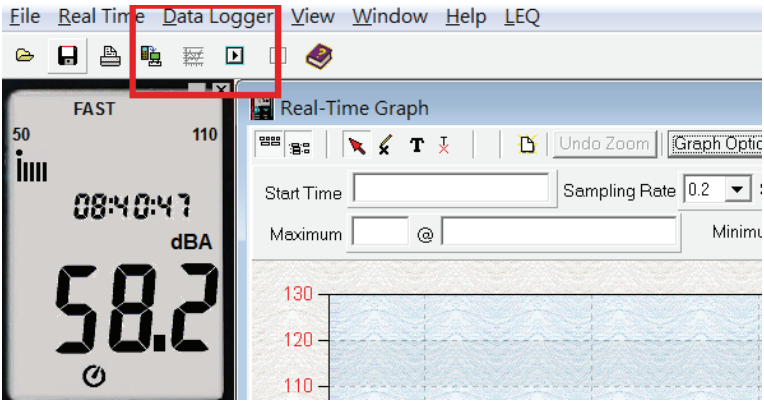


(b) There will be a save dialog window for you to choose the file name and file type to save. There are three types of file name you can choose, binary file(*.ghf), text file(*.txt) and EXCEL format file(*.csv). The *.ghf file use much fewer disk space to save the data than the other two file format, but it can only be used in SE324. Text file can be opened by SE324 and any other word processor program like word, notepad etc. EXCEL format file can be opened by SE324 and Microsoft EXCEL.



(3) How to load the recorded data from the memory of Sound Level Meter and save it to a file?
(Only for the model with Data Logger)

(a) Power on the Sound Level Meter.
(b) Press the REC button of the meter to start recording data.
(c) After a while, press REC button again to stop recording data.
(d) Connect the Sound Level Meter to PC
(e) Start SE324 program.
(f) Choose Data Logger from main menu or click from tool bar.



(g) In reference to Data Logger, see DataLogger.

Frequently Asked Question:

(1) How can I save the graph to a file which can be used in EXCEL?

Answer: When you save a graph to a file, the default file format is "*.ghf" and you can select *.csv to save files. CSV is an EXCEL file format. You can open it in EXCEL.

(2) How to uninstall SE324?

Answer: Uninstall SE324 by launching the Add/Remove Programs applet out of the Control Panel, highlighting the SE324, and clicking on the Add/Remove... push button, then it will remove the SE324 folder and files from your computer.

(3) How to zoom the graph?

Answer: Press the left mouse button and drag the cursor to select the new extents, and then release the mouse button.

(4) When I setup the real time sampling with a fast rate, some of the sampling data might be lost.

Answer: This might be caused by slow response time of the PC.

Authorized Distributor
APL ASIA CO., LTD.
11/129-132 Moo.5 Lamlukka Rd.,T.Kookut, A.Lamlukka, Pathumthani 12130 Thailand.
TEL. 0-2995-4461-4
www.apl-asia.com
EMAIL : sales@apl-asia.com
LINE@ : @APL-ASIA