

**TENMARS**

**ST130 & ST130S**

**Noise Dose Meter**

**User Manual**

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# Instrument at a Glance

## Overview

The **ST-130/ST-130S** is designed to test noise exposure in accordance with US Occupation Safety and Health Administration (OSHA), American Conference of Governmental Industrial Hygienists (ACGIH), Safety and Health Administration (MSHA), DOS, and ISO standards.

**Scarlet ST-130/ST-130S** also provide fast and easy on-site surveys to help determine noise reduction requirements.

The meter can also be used in SLM (sound level meter) mode. The SLM mode has a data logging feature that can recode up to 1000K readings which can be downloaded and transmitted to PC for further analysis through built-in USB interface.

**Applications:** Evaluation of environmental noise, Measurements of noise at workplaces, Assessment of product noise.



## Display



Icon	Meaning
	Battery icon
	Auto power off enabled
	Start / Pause / Stop
	115 dB indicator
	140 dB indicator (peak)
<b>USB</b>	USB interface
<b>M</b>	SPL Hi dB range: 140...70 dB
<b>M</b>	SPL Mid dB range: 110...50 dB
<b>L</b>	SPL Lo dB range: 90...30 dB
<b>SLM</b>	Sound Level Meter mode
<b>%</b>	Noise dose %
<b>dB</b>	Unit of sound noise
<b>USB</b>	USB cable connected
<b>SD</b>	SD card inserted
	Low battery
<b>A/C/Z</b>	A / C / Z weighting
<b>BEG/END/DUR</b>	Start test / Stop test / Test duration
<b>MEM</b>	Visiting recorded data
<b>Impulse</b>	Time constant is impulse response
<b>Fast</b>	Time constant is fast response
<b>Slow</b>	Time constant is slow response
<b>OVER</b>	Measurement over Hi level
<b>UND</b>	Measurement under Lo level
<b>REC</b>	Auto record is on. When this icon flashing means recording
<b>SET</b>	In setting mode

# Getting Started

## Before using

The instrument has been checked mechanically and electrically prior to shipment. Please make sure that the instrument is without any visible damages before using.

However, it is advised to carry out a rapid check in order to detect any possible damage that may cause during transport. If the device is already damaged, please make a claim to our dealer immediately. Check the packaging content according to packing list reported in 7.3.1 chapter. In case of discrepancies, contact the dealer immediately.

## Key concept

**2 Modes** The meter can be in either Noise Dosimeter Mode (NDM) or Sound Level Meter Mode (SLM). The meter works in one mode at a time.

**STOP** Whenever a measure session has been started, user needs to press **STOP** button before doing further operation.

## Power supply

The instrument is powered by 9V battery. When battery voltage is low, the low battery symbol will show up on the display.

**CAUTION:** If you don't use the instrument for a long period, please take the batteries out to prevent eventual acid leakage.

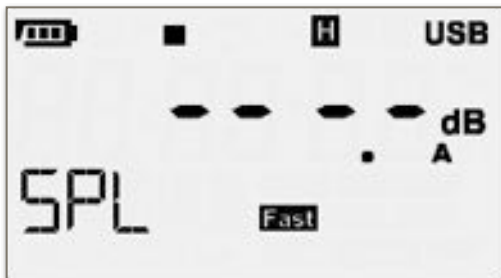
## Calibration

The instrument complies with the technical specifications contained in this manual and such compliance is guaranteed for 1 year. The re-calibration is suggested to be taken after one year.

## Storage

If the device was kept in extreme environmental conditions such as high temperature. Please make sure the instrument return to normal measuring conditions before using it.

## Measure Noise Doses (NDM mode)



### Measure data

- ▶ Turn on the meter by pressing **POWER** button. Make sure the meter is in NDM mode which means the icon "SLM" is *not* showed.
- ▶ Press **START/PAUSE** button to measure noise dose. Press **START/PAUSE** button again to pause.
- ▶ Press **STOP** button to stop testing.

### Review data

- ▶ Press **RIGHT** button to view parameters in order: SPL > Dose% > LPMAX > LPMIN > PKMAX > LEQ > SEL > LEP8 > TWA8 > LVAG > LN%
- ▶ Press **LEFT** button to review time stamp of the measurement:
  - BEG** Time stamp when the measurement starts.
  - DUR** Total duration of measurement.
  - PAUSE** Total duration of pausing.
  - END** Time stamp when the measurement ends.
- ▶ NOTE: time stamp format is hh:mm:ss. Press **ENTER** to toggle between date & time stamp. Date format is YY-DD-MM.

## Measure Sound Level (SLM mode)



• • Icon SLM displayed

### Enter SLM mode

- ▶ Press **POWER** button to turn the meter on.
- ▶ Press **SET** button to enter setup mode. There are 7 function settings.
- ▶ Press **UP** or **DOWN** button to select "SLM" mode on LCD, then press **ENTER**.

### Measure data

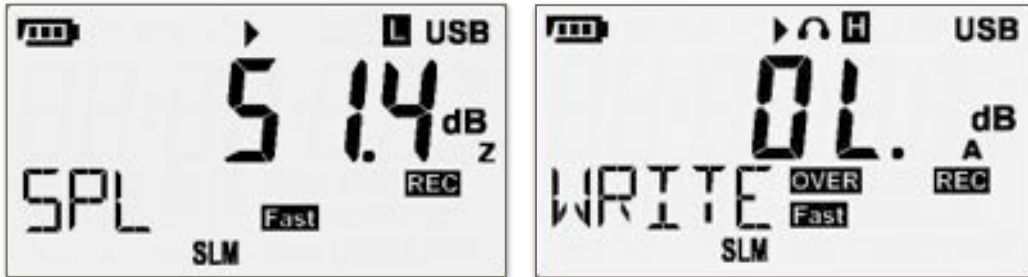
- ▶ Press **RIGHT** button to select test functions: SPL > Leq > SEL > PeakMAX. *Note:* To switch between different modes, please press **STOP** button first.
- ▶ Press **START/PAUSE** button to noise doses measurement. To pause, press **START/PAUSE** button again.
- ▶ Icon "**OVER**" or "**UND**" displayed when sound level exceeds the bounds.
- ▶ Leq integral time and same sampling time can be set in setup mode. Refer to "Settings" section.
- ▶ When the sampling time is set to zero, the integration time will not be stopped until the user exits the measure.
- ▶ Press **STOP** button to stop testing.

**CAUTION:** Wind blowing across the microphone results in additional extraneous noise. Please mount the windscreen to prevent the undesirable signals in high wind condition (> 10 m/s). Keep the microphone dry and avoid severe vibration.



# Record Data

## Auto recording



- ▶ In Setup mode > Sampling Rate & Auto Record Setup > Make sure auto record function is on. Please refer to "Settings" section.
- ▶ In SLM mode, press **START** button to turn on recorder. Icon "REC" flashes.
- ▶ Bottom left of LCD shows "WRITE" indicates the data is written to memory.
- ▶ Bottom left of LCD shows "FULL" to indicate memory is already full.
- ▶ When running Auto Record mode, the manual one-shot recording function will not work.

## Single record

- ▶ Press **REC/MEM** button to save on-screen readings. Icon "REC" flashes.

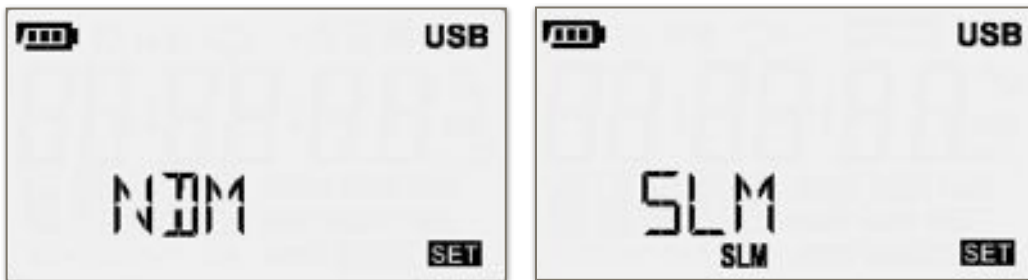
## Read data

- ▶ Long press **REC/MEM** button to enter the data reading mode when icon MEM showed on the screen.
- ▶ Press **UPPER** or **DOWN** button to scroll through the readings. The data will first come with a number which means the order of recording. Then the detail information is shown on the screen.
- ▶ When data were recorded under NDM mode, user can press **RIGHT** button to select noise dose meter information.
- ▶ Press **LEFT** button to view date & time of data. Press **ENTER** button to switch between date & time. (**Note:** Time format hh:mm:ss, date format YY-MM-DD)
- ▶ Long press **REC/MEM** key again to exit data reading mode.

# Setup Mode

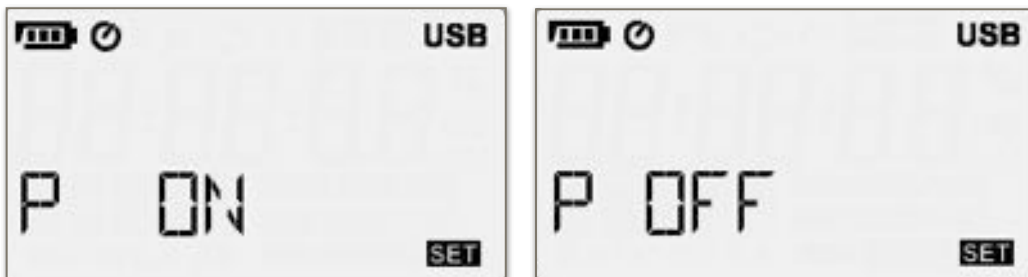
- ▶ Press **SET** button to enter setup mode.
- ▶ Press **SET** button to switch between 7 different settings: Test Mode > Auto Power Off > Sampling Rate & Auto Record > Real Time Clock > 94dB Offset Adjust > Noise standard > SLM Function
- ▶ Press **SET** button again to save the current settings and jump to next function setting mode.
- ▶ In any settings, press **ENTER** to save & quit Setup mode.

## Test Mode



- ▶ In the test mode setup page, press **UP** or **DOWN** button to change test mode (2 modes: NDM and SLM)
- ▶ NDM: Noise Dose Meter
- ▶ SLM: Sound Level Meter

## Auto Power-Off



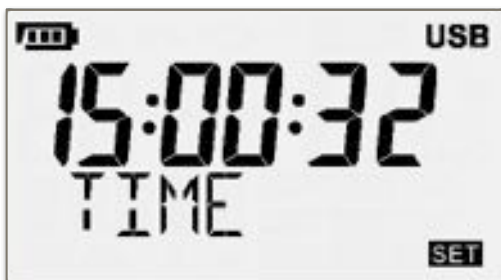
- ▶ In the auto power-off setup page, press **UP** or **DOWN** button to enable or disable Power Off Function.

## Sampling Rate & Auto Record Setup



- ▶ In the sampling rate & auto-record setup page, press **RIGHT** or **LEFT** button to select auto record setup or sampling rate page.
- ▶ Press **UP** or **DOWN** button to enable auto record or adjust sampling rate.
- ▶ Sampling rate from 1 sec ... 23 hr 59 min 59 sec.

## Real-Time Clock



- ▶ In the real-time clock setup page, press **RIGHT** or **LEFT** button to adjust timer setting.
- ▶ Press **UP** or **DOWN** button to adjust digit of numbers.

## 94 dB Offset Adjust Mode



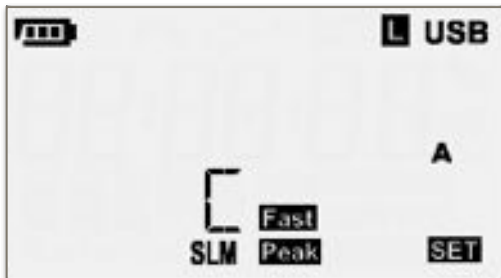
- ▶ In the 94dB offset adjust setup page, press **ENTER** button to auto-run 94dB adjustment.
- ▶ Press **RIGHT** or **LEFT** button to change the weighted filter.
- ▶ Press **UP** or **DOWN** button to adjust offset.

## Noise Standards Setup



- ▶ In the noise standards setup page, press **UP** or **DOWN** button to select different NDM standards.
- ▶ **Note:** The standards include: OSHA > MSHS > DOD > ACGIH > ISO85 > ISO90 > USER

## SLM function Setup



In SLM function setup page, press **RIGHT** and **LEFT** to switch test function. Press **UP** and **DOWN** to switch among settings: Sound level range > Time weighted > Frequency weighted > Peak frequency

### Sound level range

- ▶ "H" SPL Hi dB Range (140-70 dB)
- ▶ "M" SPL Mid dB Range (110-50 dB)
- ▶ "L" SPL Lo dB Range (90-30 dB)

### Time weighted

- ▶ **Fast, Slow and Impulse**

### Frequency weighted

- ▶ A, C and Z

### Peak frequency

- ▶ **Peak C and Peak Z.**

# Acoustic Glossary

## Sound level parameters

Test Function	Screen parameter	Description
SPL	LAFp	Sound pressure level (SPL)
SPL	LASp	Sound pressure level (SPL)
SPL	LCFp	Sound pressure level (SPL)
SPL	LCSp	Sound pressure level (SPL)
SPL	LZFP	Sound pressure level (SPL)
SPL	LZSp	Sound pressure level (SPL)
Leq	LAFq	Equivalent continuous level for the duration of the measurement for A weighting
Leq	LCFq	Equivalent continuous level for the duration of the measurement for C weighting
Leq	LZFq	Equivalent continuous level for the duration of the measurement for Z weighting
SEL	LAE	Frequency weighted sound exposure level for the duration of the measurement for A weighting
SEL	LCE	Frequency weighted sound exposure level for the duration of the measurement for C weighting
SEL	LZE	Frequency weighted sound exposure level for the duration of the measurement for A weighting
Peak	Lcpeak	Instantaneous C peak level

## A/C/Z weighting

A: The A weighting curve is based on 40 Phon Fletcher-Munson Equal Loudness Contour. Suggest to use the A weighting for noise assessment on human beings..

C: The C weighting is essentially is approximate smooth. Suggest using the C weighting with labor safety concern.

Z: The Z weighting for the electric instrument interior not the linear signal which processes after the filter, suits in wants to output AC or the DC signal does other research to use. The Z weighting is a linear signal which is not processed through the filter. It's suitable to output AC or DC signal for research.

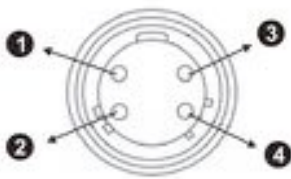
## Classification

- Class 0: use in the laboratory reference standard.
- Class 1: laboratory or field use.
- Class 2: laboratory or field use.
- Class 3: general field use.

# Hardware

## Input Interface

The front is PLT 4, the signal input receptacle



Pin	ST-130S	ST-130
1	Power (+)	Power
2	GND	GND
3	Power (-)	NC
4	GND	NC

## ST-130S Microphone

- Diameter : 1/2 inch
- Polarization voltage : 0 V
- Dynamic range : 25 dB...140 dB
- Sensitivity :  $-32 \pm 3$  dB (250 Hz 0 dB = 1V/Pa)
- Free field frequency response :  $\pm 2$ dB(25Hz...12.5kHz)

Frequency (KHz)	Deviation of pressure
0.25	0.0
1	-0.1
2	-0.5
3	-0.6
4	-0.9
5	-1.2
6	-1.7
7	-2.2
8	-2.8
9	-3.3
10	-4.1
12.5	-6.0

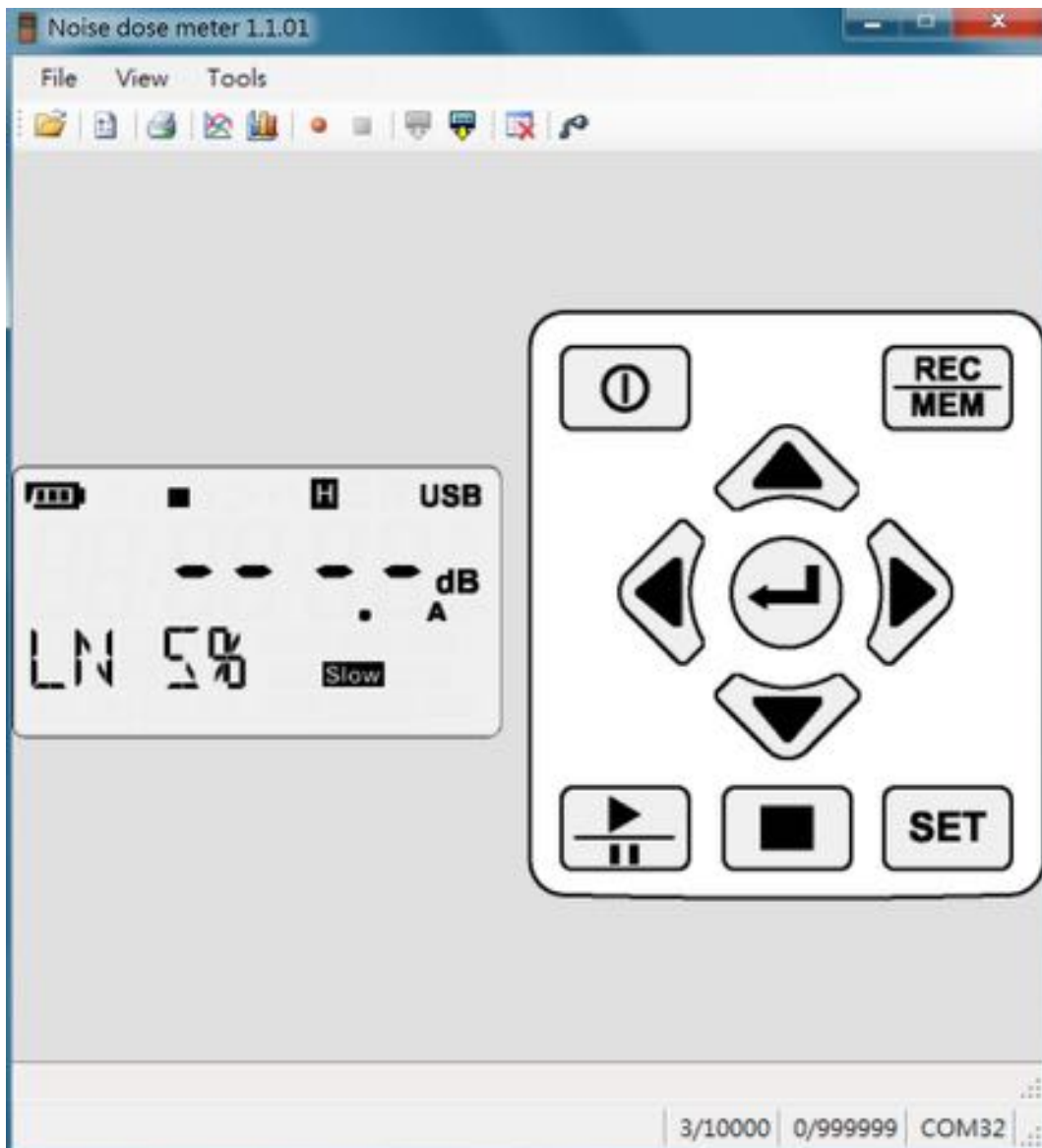


# Software











## Main screen

ST-103 App running on Windows provides user an intuitive interface to control dosimeter in real-time, to capture dose report & sound level log, to draw plots and download data out of the meter.

User is able to trigger sound level logging by one button clicking and read the log and corresponding graphical plots by opening csv file in the App.



## Icons

Icon	Function
	Open file
	Options
	Print noise dose report (*.ndr)
	Sound level chart
	Noise dose chart (LN%)
	Start log sound level (*.csv)
	Stop log sound level
	Download sound level log & noise dose report
	Erase meter data
	Port detection

## Getting started

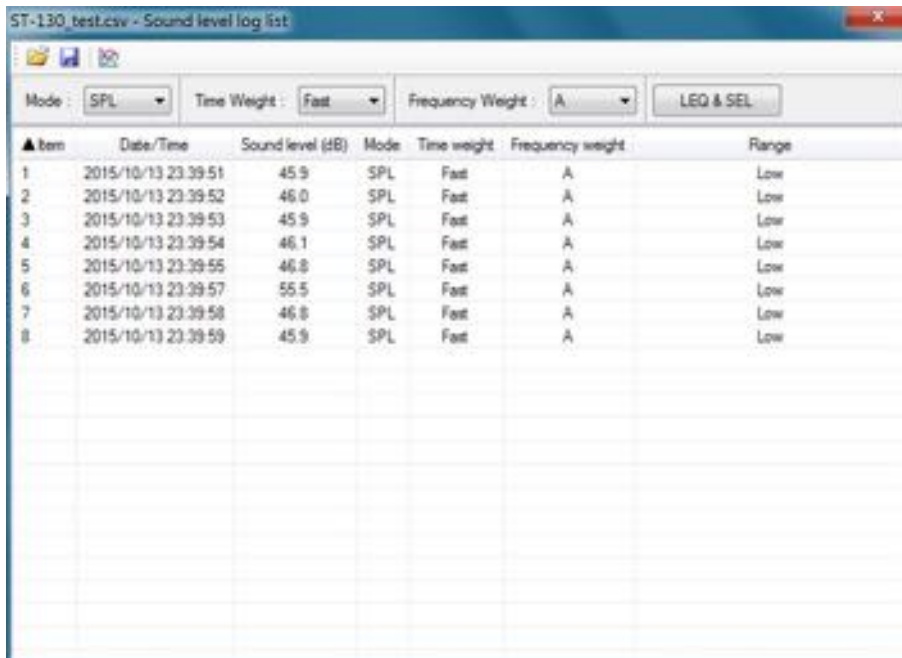
- ▶ To install necessary softwares, run AutoRun.exe and the UI will guide you to go through the steps.
- ▶ Connect the meter and PC with the USB cable shipped with the instrument.
- ▶ Press Port detection icon and the App will connect to the meter automatically.
- ▶ Control the meter with virtual panel.

## System requirements

- Operating System: Windows® XP/ Windows Vista/ Windows 7/Windows 8
- Storage:200 MB of available hard disk space.
- Processor: Intel Pentium® 4
- Memory: 1GB RAM (XP), 1.5 GB (Windows Vista/Windows 7/Windows 8)
- Other: PL2303 Windows Drive; Microsoft .NET Framework 3.5 Service Pack 1
- Required software & driver are shipped with meter. User can also download it from Scarlet web site.




## Sound level log

Open sound level log (\*.csv) generated by the App and the following window will pop up.



▲ Item	Date/Time	Sound level (dB)	Mode	Time weight	Frequency weight	Range
1	2015/10/13 23:39:51	45.9	SPL	Fast	A	Low
2	2015/10/13 23:39:52	46.0	SPL	Fast	A	Low
3	2015/10/13 23:39:53	45.9	SPL	Fast	A	Low
4	2015/10/13 23:39:54	46.1	SPL	Fast	A	Low
5	2015/10/13 23:39:55	46.8	SPL	Fast	A	Low
6	2015/10/13 23:39:57	55.5	SPL	Fast	A	Low
7	2015/10/13 23:39:58	46.8	SPL	Fast	A	Low
8	2015/10/13 23:39:59	45.9	SPL	Fast	A	Low

## Icons

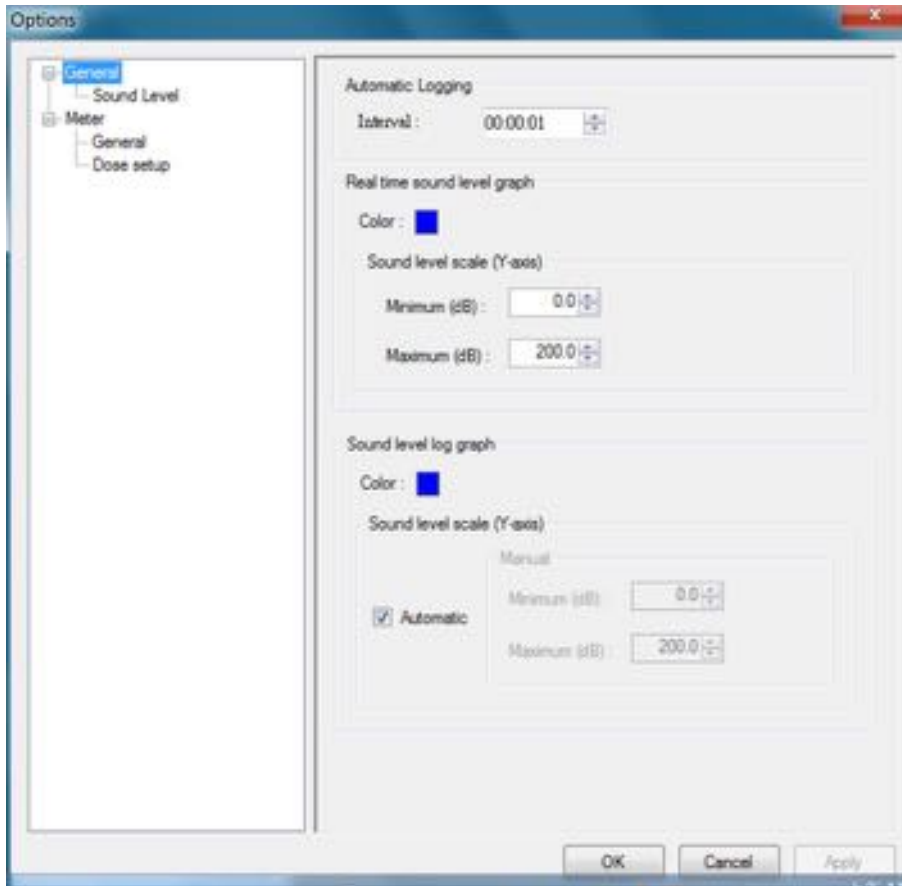
Icon	Function
	Open file
	Save file as...
	Show graph

## Drop down menu



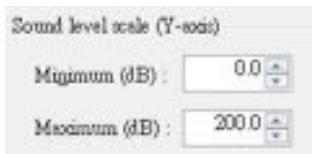
Icon	Function
Mode : <input type="text" value="SPL"/>	SPL > LEQ > SEL > PeakMax
Time Weight : <input type="text" value="Slow"/>	Fast > Slow > Impulse
Frequency Weight : <input type="text" value="A"/>	A > C > Z
<input type="button" value="LEQ &amp; SEL"/>	Calculate LEQ & SEL

## Settings

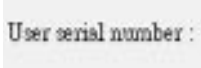
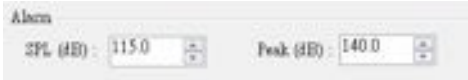
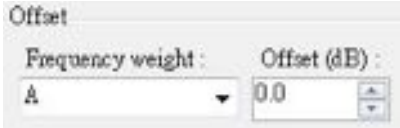


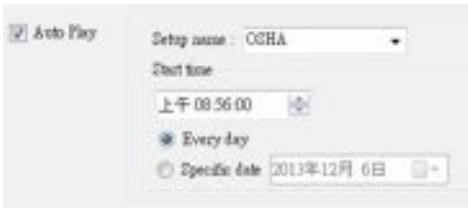
Main screen > Tools > Options. User can setup General (PC settings) and Meter (ST-130 settings) via the interface.




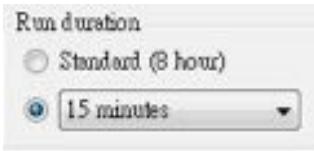

### General settings

Icon	Function
	PC data logger sample rate
	Color of the curve
	Y-axis sound level range

## Meter Settings

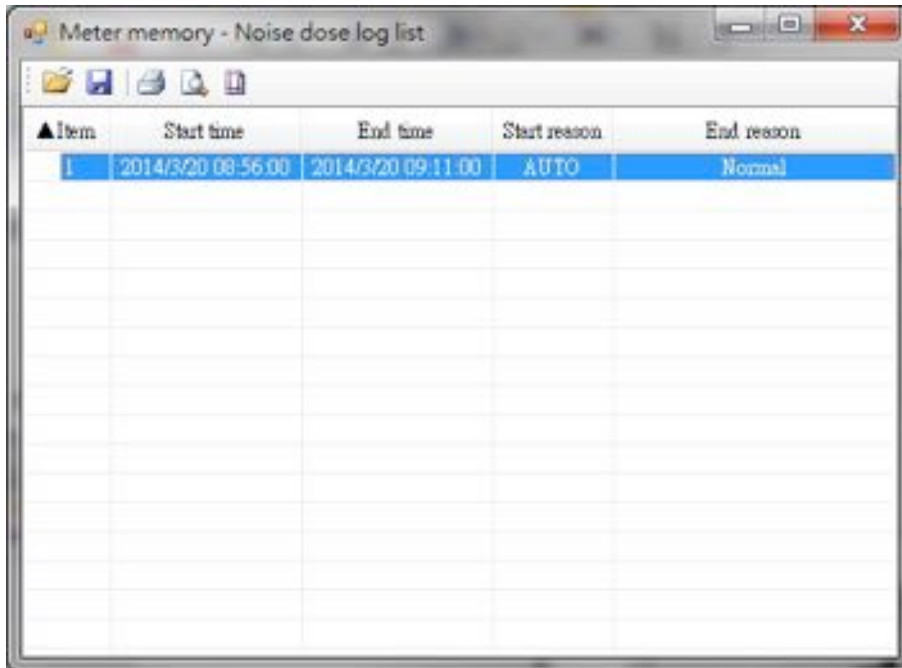
Icon	Function
	Serial number. 0...9; A...Z; 16 words
	Alarm settings
	Offset settings
	Real time clock
	Enable/disable auto record. Sample rate.
	Enable/disable auto play noise dose measurement. Meter must be in NDM mode.

## Dose Meter Setting

Icon	Function
	Select noise dose standard
	Select play noise dose measuring duration.
	Import/export *.ncg file

## Print Noise Dose Report (\*.ndr)

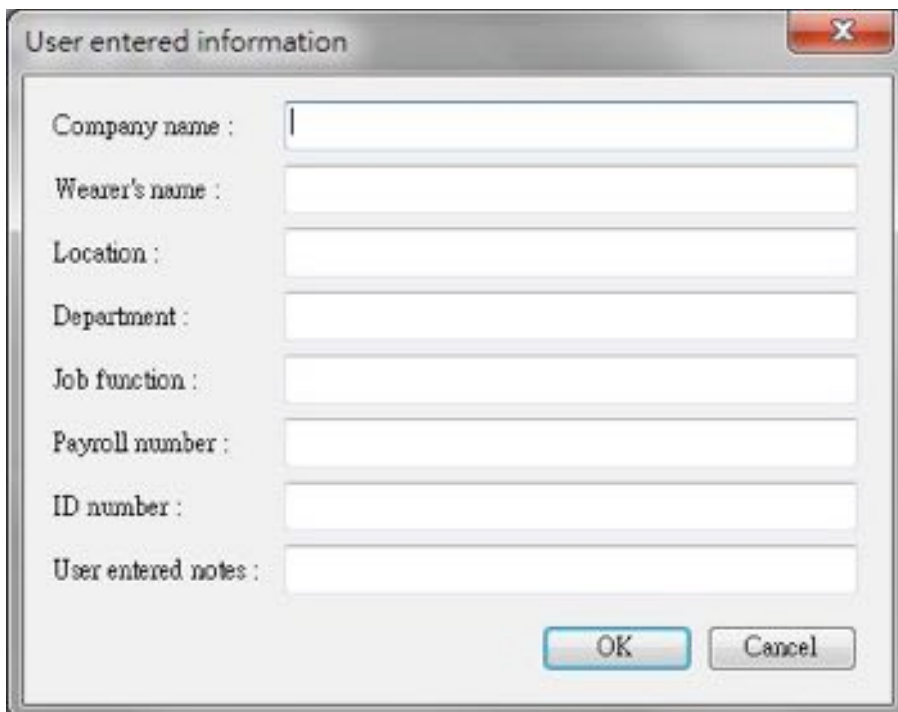
- ▶ Select noise dose logger report (\*.ndr)



The screenshot shows a window titled "Meter memory - Noise dose log list". It contains a table with the following columns: Item, Start time, End time, Start reason, and End reason. The first row is highlighted in blue and contains the following data:

Item	Start time	End time	Start reason	End reason
1	2014/3/20 08:56:00	2014/3/20 09:11:00	AUTO	Normal

- ▶ Click "Search" button for report output



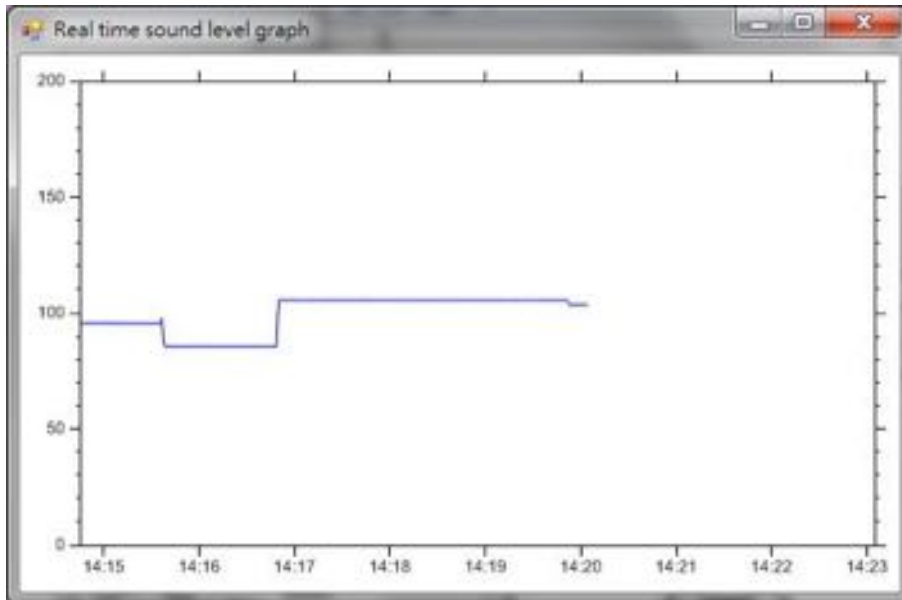
The screenshot shows a dialog box titled "User entered information". It contains several input fields for user details:

- Company name :
- Wearer's name :
- Location :
- Department :
- Job function :
- Payroll number :
- ID number :
- User entered notes :

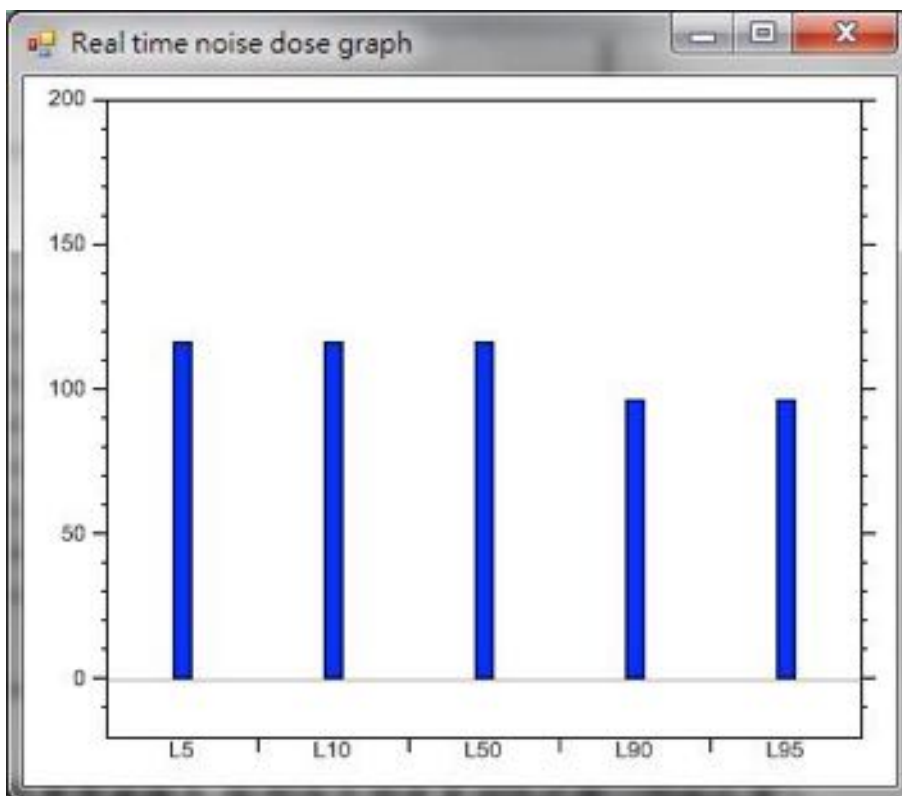
At the bottom right, there are two buttons: "OK" and "Cancel".

## Sound level chart & Noise dose chart (LN %)

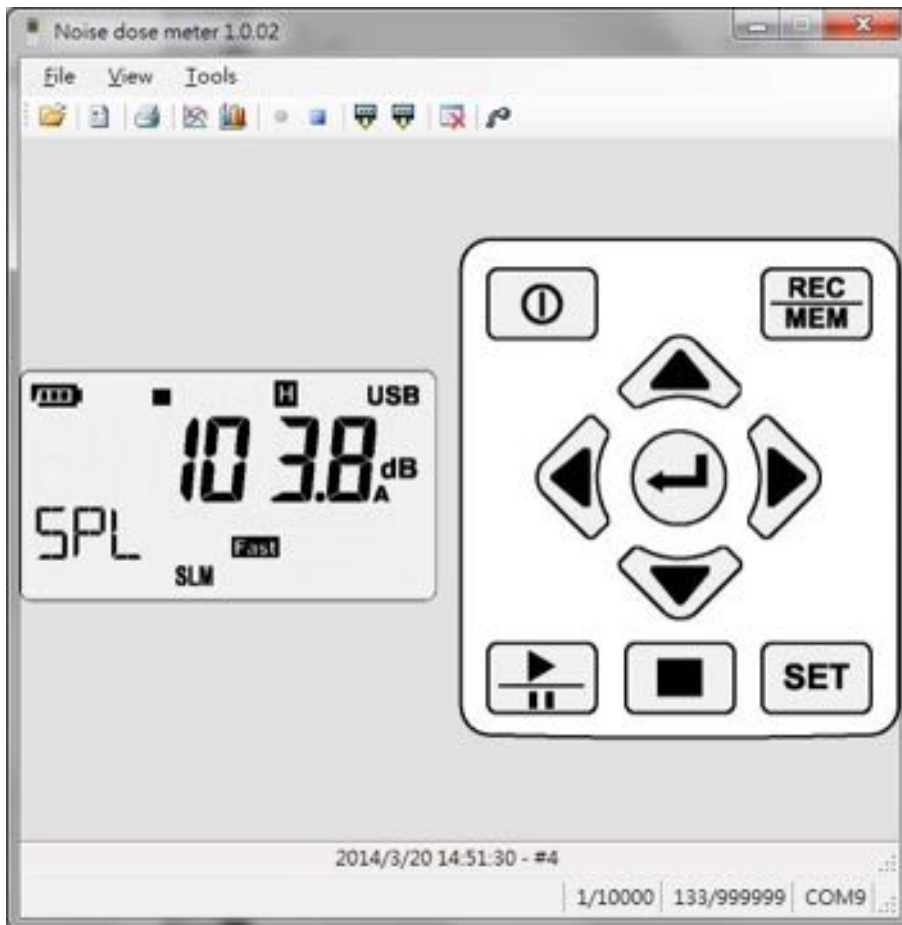
Sound level char. X-axis is the time coordinate.Y-axis is the sound coordinate.





Noise does chart. X-axis is the LN%. Y-axis is the sound coordinate.



## Enable PC data logger




- ▶ Click Record button  to enable data logger
- ▶ Create a new log file (\*.csv)
- ▶ Click Stop button  to stop data recording




## Download & erase recorded data

### Download

- ▶ Click Download button  to download sound level logs or noise dose report from the meter memory
- ▶ It usually takes 15 minutes to download 100,000 recorded data

### Erase

- ▶ Click Erase button  to delete all records in the meter

# Technical Specifications

<b>Display</b>	Single LCD MAX reading 999999
<b>Display Refresh Rate</b>	1 Time/sec
<b>Standards</b>	IEC 61252-1993 IEC 61672-1-2003 ANSI S1,25-1992 ANSI S1,4-1983 ANSI S1,43-1997
<b>Microphone(ST-130S)</b>	1/2" pre-polarized condenser microphone build in preamplifier: 1V/Pa@250HZ, frequency range: 20 Hz~12.5 kHz, Thermal noise: <25 dB(A)
<b>Microphone(ST-130)</b>	1/2 inch Electret condenser microphone
<b>Measurement Items(NDM)</b>	Doses%, Lxyp, Lxmax, Lxmin, Lxeq, SEL(LAE), Peak, LAVG, TWA, LEP, LN%
<b>Measurement Items(SLM)</b>	Lxyp,Lxmax,Lxmin,Lxeq,SEL(LAE),Peak
<b>Measurement Range</b>	30dB to 130dB (A) 35dB to 130dB (C) 40dB to 130dB (Z)
<b>Dynamic Range</b>	60 dB
<b>Accuracy</b>	±1.5dB@94dB 1KHZ
<b>Internal memory</b>	MAX Datalogger data : 10000(NDM); 1000000(SLM)
<b>Maximum Peak C Weighting Sound Level Measurement</b>	90~143 dB
<b>Time Weighting</b>	Fast, Slow, Impulse, Peak
<b>Frequency Weighting</b>	A/C/Z
<b>Frequency Range</b>	20Hz~8KHz
<b>Starting Time</b>	< 10 Second
<b>Battery Life(ST-130)</b>	24 hours ( 9V×1 battery Alkaline )
<b>Battery Life(ST-130S)</b>	20 hours ( 9V×1 battery Alkaline )
<b>Dimensions</b>	113(L) x 65(W) x 34(H) mm

NOTE: Environmental conditions: temperature 23° C ± 5° C, relative humidity < 80%rh.

## Standard

**IEC and other standard** IEC 61252 (1993); IEC 61672-1 (2003); ANSI S1, 25-1992; ANSI S1, 4-1983; ANSI S1, 43-1997.

**EMC** This instrument was designed in accordance with EMC Standards in force and its compatibility has been tested in accordance with EN61326-2 (2006).



# Handling, & Maintenance

## Important handling information

**Cleaning** Clean instrument immediately if it comes in contact with anything that may cause stains— such as dirt, ink, makeup, or lotions. To clean:

- Disconnect all cables and turn instrument off.
- Use a soft, lint-free cloth.
- Avoid getting moisture in openings.
- Don't use cleaning products or compressed air.

### Operating Environment

- For inside use, max height: 2000m
- Reference temperature:  $23^{\circ} \pm 5^{\circ} \text{C}$
- Operation temperature:  $5^{\circ} \dots 40^{\circ} \text{C}$
- Operation humidity:  $< 80\% \text{RH}$
- Storage temperature:  $-10^{\circ} \dots 60^{\circ} \text{C}$
- Storage humidity:  $< 70\%$

The instrument can be damaged and battery life shortened if stored or operated outside of these temperature ranges. Avoid exposing the instrument to direct sunlight even the the air temperature is within the limits.

**Operating humidity** The instrument is designed to work in humidity  $< 80\%rh$  and stored in dry place where humidity is less than  $70\%rh$ .

**Store microphone carefully** Microphone is the key component of the instrument and keep it dry and avoid severe shake or vibration.

**Battery replacement** Low battery icon displayed in LCD indicates the user needs to replace batteries. To replace:

- Turn off the instrument.
- Remove the battery cap.
- Insert new batteries and then put the cap back.
- Process the waste batteries accordingly.

## Packing list

- ST-130 Meter x 1
- User guide x 1
- Power adapter x 1 (100...240 V AC to DC 6...9V/500 mA)
- Carrying case x 1
- 9V batteries x 1 (NEDA 1604 、 IEC 6F22 or JIS 006P)
- USB sticker for software installation
- USB cable w/ mini B type

# Safety Precautions

## Safety Precautions

When taking measurements:

- Avoid doing measurements in humid or wet places - make sure that humidity is within the limits indicated in section "environmental conditions".
- Avoid doing measurements in presence of explosive gas, combustible gas, steam or excessive dust.

The following symbols are used:



**Caution:** refer to the user's manual. An incorrect use may damage the components of devices or even users.



The instrument conforms to the CE standard.

## Note During Operation

- Do not operate the instrument at temperature and humidity environment beyond to reference conditions of chapter 7.2.1.
- Keep the microphone dry and avoid severe vibration.
- Wind blowing across the microphone may bring additional extraneous noise. Once using the instrument in the presence of wind, the microphone must be mounted on the windscreen to prevent the undesirable signals.

# Warranty & Services

## Warranty conditions

This instrument is guaranteed for one year against material or production defects, in accordance with our general sales conditions. During the warranty period the manufacturer reserves the right to decide either to repair or replace the product.

Should you need for any reason to return back the instrument for repair or replacement take prior agreements with the local distributor from whom you bought it. Do not forget to enclose a report describing the reasons for returning (detected fault). Use only original packaging. Any damage occurred in transit due to non-original packaging will be charged anyhow to the customer.

The warranty doesn't apply to:

Accessories and batteries (not covered by warranty)

Repairs made necessary by improper use (including adaptation to particular applications not foreseen in the instructions manual) or improper combination with incompatible accessories or equipment.

Repairs made necessary by improper shipping material causing damages in transit.

Repairs made necessary by previous attempts for repair carried out by non-skilled or unauthorized personnel.

Instruments for whatever reason modified by the customer himself without explicit authorization of our Technical Dept.

The contents of this manual may not be reproduced in any form whatsoever without the manufacturer's authorization.

Our products are patented. The logotypes are registered. We reserve the right to modify characteristics and prices as part of technological developments which might require them.

## Services

Shouldn't the instrument work properly, before contacting your distributor make sure that batteries are correctly installed and working, check the test leads and replace them if necessary.