Sound Level Meter & Nosie dosimeter S12

User Guide 1.2

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SV CORPORATION

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Sound Level Meter & Nosie dosimeter S12

1. Sound Level Meter

Sound level meter S12 measures and displays the analog noise waveforms numerically. Sound Pressure Level, Equivalent Continuous Sound Level or Leq, Peak, etc. are displayed in decibels. Sound pressure 20 (μPa, microwave Pascal) is set as a reference level. It consists of a frontend and a sensor. It is portable and easy to use.

2. Connection

Figure 1) is a conceptual diagram of system connection. In the figure, a microphone is attached to the calibrator.
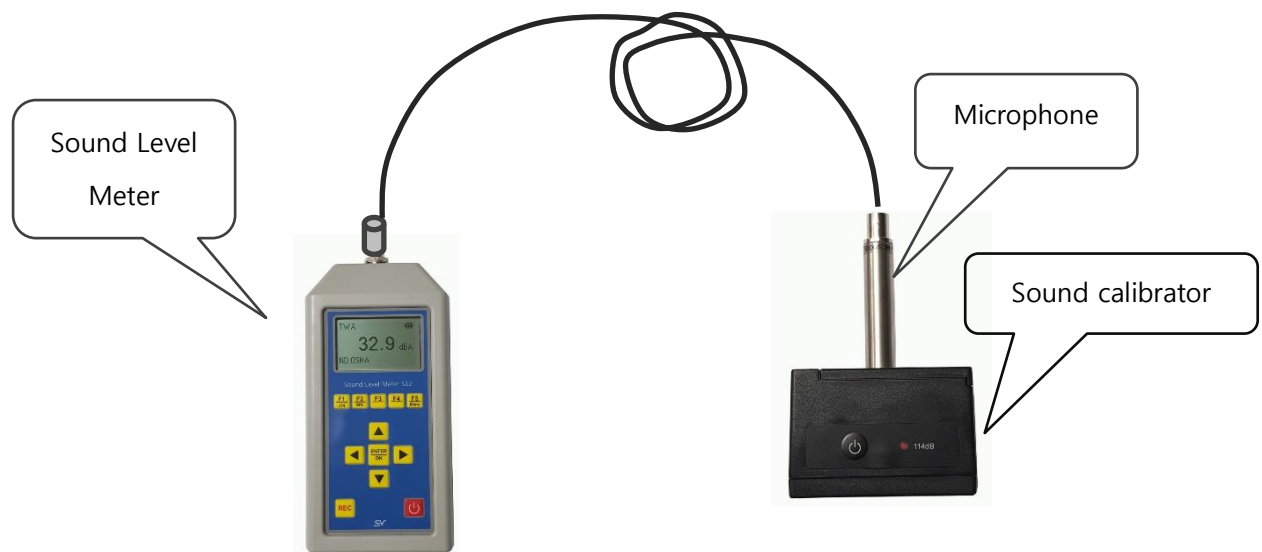

Figure 1) Connection

3. Noise measurement

3.1. Power ON

Press the <POWER> button to turn on the device. The device is in a suspended state.

3.2. Start measurement

Press the <ENTER> key. The device will display 'Stn' at the top right of the screen and start the measurement. 'Stn' means 'Standby' mode. The system waits 10 seconds for the signal to stabilize and then switches the display to Arm. Press <ENTER> again to stop the measurement. In this mode, data is not saved to the SD card. This mode is called the "Arming mode".

3.3. Recording measurement

In "Arming mode", press the <REC> button on the keypad. The device will immediately display 'Rec' at the top right of the screen and start recording. This mode is called "Recording mode". In this mode, data is stored on the SD card. Press the <REC> button again to stop the measurement. When the time elapses, it stops saving and switches to "Arming mode". To pause the recording temporarily, please press F4. You can see the symbol "===" during this pause. If you want to end the pause and continue recording press again the F4 button. It will continue recording and the symbol === will disappear from screen. But during this pause period, processing of noise/sound is continuously going on, but not recording. So the pause (F4) is only for recording. There is no pause for arming mode. Timer setting is explained in 5.5 RECORDING OPTIONS.

The file name 'YYMMDD_HHMMSS.txt' is displayed in the lower right corner during saving. This result text file is saved in folders with the mode name. For example, if measurement mode is SLM, the result file will be stored in SLM/ folder. Similarly if the mode is ND, the result files are stored in ND/ folder. Please note that for all modes the file name is same format as explained in the beginning this paragraph. If the user presses the <REC> button in idle mode, it displays 'Stn' and waits 10 seconds without recording. After that, display 'Rec' and start recording measurement.

3.4. Toggle noise value display

 When you press the F2 key, the device displays sound pressure level(SPL). 'LAF' is displayed on the upper left of the screen. Each press of the F2 key toggles the quantification of noise in the order LAF, LAFmax, LAFmin, and LApeakMax. The user can press F1 to view the equivalent continuous sound pressure level (Leq). In this case, LAeq [In], LAeq [Avg], LAmax, LAmin, LpeakMax, L10, L30, L50 and L90 are switched in this order. You can change the frequency weighting (Z, A, B, C) and time constant (F, S, I) in 5.4 ANALYSIS OPTIONS.

4. Noise dosimeter

 A noise   dosimeter (American   English)   or noise   dosemeter (British   English)   is   a specialized sound level meter intended specifically to measure the noise exposure of a person integrated over a period of time; usually to comply with Health and Safety regulations such as the Occupational Safety and Health (OSHA) 29 CFR 1910.95 Occupational Noise Exposure Standard or EU Directive 2003/10/EC.

4.1 Noise DOSE (%)

 The amount of actual exposure relative to the amount of allowable exposure, and for which 100% and above represents exposures that are hazardous. The noise dose is calculated according to the following formula:

 1) Variable noise field

   D = [C1/T1 + C2/T2 + Cn/Tn] × 100

 2) Constant noise field

   D = [C/T] × 100

     Where:

         Cn = total time of exposure at a specified noise level

         Tn = exposure time at which noise for this level becomes hazardous

         C= Actual Exposure Time

         T= Permissible Exposure Time

4.2 TWA (Time Weighted Average) dB(A)

The TWA shows a worker's daily exposure to occupational noise (normalized to an 8 hour day), taking into account the average levels of noise and the time spent in each area. This is the parameter that is used by the OSHA Regulations and is essential in assessing a workers exposure and what action should be taken.

1)8hours Time Weighted Average level (dBA)

The averaging of different exposure levels during an exposure period. For noise, given an 90dBA (85dBA)* exposure limit and a 5dB (3dB)*exchange rate, the TWA is calculated according to the following formula: ( )*= ISO Standard

- OSHA;   TWA=16.61log(D/100)+90

- ISO;   TWA=10log(D/100)+85

D=Dose(%)

T=Measurement time (OSHA;T=$\frac{8}{2^{L-90/5}}$, ISO; T= $\frac{8}{2^{L-85/3}}$)

2) Time Weighted Average level (L_{avg} (dBA)), (measuring time< 8hr, measuring time>8hr)

- OSHA;   TWA=16.61log(D/12.5×T)+90

- ISO;   TWA=10log(D/12.5×T)+85

D=Dose(%)

T=Measurement time

4.3 Impulse noise

Impulsive noise is characterized by a sharp rise and rapid decay in sound levels and is less than 1 sec in duration. For the purposes of this document, it refers to impact or impulse noise.

4.4 Projected Dose

Dose measurements usually require the noise exposure to be measured over a full 8 hour working day. This can be simplified by using projected dose.

This dose allows the present accumulated dose over the logged time duration to be projected forward to give the predicted 8 hour dose. This can be shown by the equation as below.

$$\text{Projected Dose} = \frac{Dose * 8}{Time}$$

4.5 Percentile noise level (ln)

Ln, where n may be anything from 1 to 99, is that noise level exceeded for n% of the measurement time. By definition of percentiles, L1 must be greater than or equal to L2, which must be greater than or equal to L3, etc. It is often the case that only a few Ln values are ever used.

An example of how Ln values look in a graphical format:
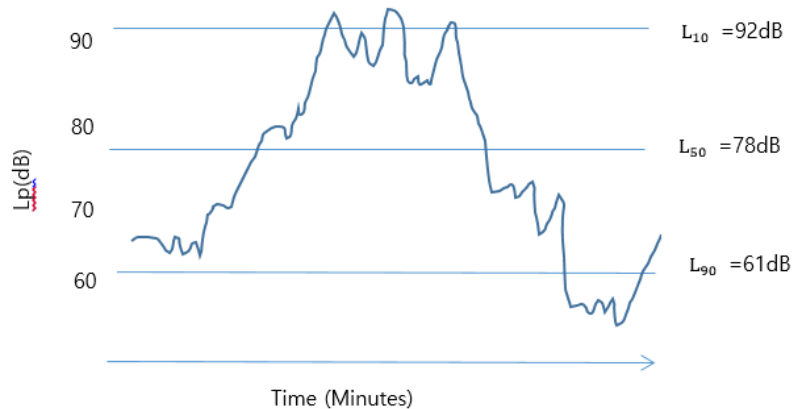
Percentile levels

L90 is frequently taken as the Lp of the background level. L10-L90 is often used to give a quantitative measure as to the spread or "how choppy" the sound was.

L10 is the noise level exceeded for 10% of the time of the measurement duration. This is often used to give an indication of the upper limit of fluctuating noise, such as that from road traffic.

L50 is the noise level exceeded for 50% of the measurement duration. It is the middle point and has been incorporated in some American Community Noise Assessments.

L90 is taken to be the ambient or background noise level.

L10-L50 is often used in such noise indices as Traffic Noise Index:

$\text{TNI} = 4 \cdot (L_{10} - L_{90}) + L_{90} + 30 \text{ (dB)}$

5. Menus

5.1 Enter the main menu

The user presses the F5 (Menu/Back) key to enter the main menu. The device then stops measuring and displays the next menu.

	Item		Description
5.2	Mode		To select SLM or Noise Dosimeter
5.3	Common	1) Setting	To set the measurement condition
		2) Time date	To edit the time and date
		3) Device Options	To set the device condition
		4) Information	To show the system information
		5) Serial Number	To enter the device serial number
		5) Calibration	To calibrate the sensor
5.4	Analysis Options	1) Sound level meter	To analysis measurement data
		2) Noise dosimeter	
		3) Percentile level	
5.5	Recoding Options	1) Sound level meter	To set the recording conditions
		2) Noise dosimeter	
		3) Percentile level	
5.6	GPS		To show the GPS data
5.7	Print		To select the data and print out

5.2 Mode

1) Sound level meter

2) Noise dosimeter

5.3. Common

1) Settings

① **Refres Tim**, 'Refresh Time' To select the refresh rate.

{0.3, 0.5, 1, 5 seconds}, *default : 1 seconds*

② **PwrOnStart**, 'Power On Starting' Measurement starts automatically when power is applied.

{Off, On}, *default : off*

2) Time and date

Set the time and date. The <◀/▶ LEFT/RIGHT> key moves the cursor. The <▲/▼, UP/DOWN> keys scroll through the values. Move the cursor to 'OK' and press the <ENTER> key to complete the setting. Selecting the Cancel key cancels it.

3) Device Options

Select the device option. There is an LCD backlight on time or an auto power off time.

① **Backlight**, Select the backlight on time.

<Not use> : Turn off the backlight of the LCD. ← *default*

<5 sec> : LCD backlight turns off 5 seconds after keypad button is pressed.

<10 sec> : LCD backlight turns off 10 seconds after keypad button is pressed.

② **Auto pwoff**, 'Auto power off' If there is no key input after stopping the measurement, the device will be turned off.

<5 min> : The device turns off after 5 minutes.

<10 min> : The device turns off after 10 minutes.

<Not use>; Not adopt "auto pwoff" ← *default*

③ **s/w update**, 'Software update' Update the firmware.

Selecting this item will display a warning message. If you are not informed by the SV

Corporation, you must press F5 to cancel. When prompted, press the OK button to proceed with the update.

4) Information

Display system version information.

Sound Level Meter/Noise Dosimeter

SV Corporation

Ver.;

Algorithm;

Serial Number;

5) Serial Number

User needs to enter his SLM device number. Device serial number is a 12 digit alpha-numeric number, written on the backside of the device. Enter the last 5 digits of the serial number in this filed. This serial number will be shown in summary print receipts, all result text files of all modes.

6) Calibration

It consists of the following submenus.

Start	Start calibration.
Transducer	Set up the transducer and calibrator.
Back	Return to the main menu.

(1) Calibration process

① Plug the microphone into the calibrator.

② Press the <POWER> button to turn on the power.

③ Press <▲, UP> key on the main menu to select 'CALIBRATION'. This will enter the calibration assistant menu.

④ Scroll to the <▼, DOWN> key and select the 'Transducer' item. Then select the desired values.

Sensitivity : 50.0mV/Pa

Nomi RMS, Nominal RMS : 94.0 dB, 114 dB,

Nomi Freq, Nominal Frequency : 1000.0 Hz

Calibr Coef , Calibration Coefficient : 1.0

⑤ Press the <▲/▼, UP/DOWN> buttons to move the cursor to OK/Cancel. Then press the <ENTER> key.

⑥ Turn on the calibrator.

⑦ Press the <ENTER> key to select the "Start" item. "Preparing..." and "Processing..." Is displayed.

After 1 minute has elapsed, the correction coefficient is finally displayed as 1.0xxxx.

If the OK button is pressed while the calibration is in progress, the calibration stops.

⑧ Press <ENTER>, scroll down and press 'Back'. The calibration coefficients are automatically stored in nonvolatile memory, so they remain on even if the power is turned off.

6) Print; Print options

(1) Show files; All, last 50, last 30 selectable with <▲/▼, UP/DOWN>button

■ Print out format (Report)

① SLM Measurement Report

SUM210107.025249.txt — Folder name\file name

Karnataka State Pollution Control Board — User defined Logo / User defined Tag Line

Date: Jan 7 02:52:49 2021 — Measurement start date and time

Serial No: SV10MM000000 — Serial number of the device

GPS: nan ; nan — GPS coordinates

Calibration Coef: 1.0000 — Calibration Coefficient

Model No: S12 — Device Model Number

Accuracy : Class1 — Device measuring accuracy

Timer : 6 hours — Recording time duration

Stop : 2021 Jan 7 08:52:47 — Measurement stop time

RESULT (dB) — Results in dB unit

Parameter	Value (dB)
LAeq[in]	46.30
LAeq[avg]	46.18
LAmax	78.85
LAmin	37.22
LApeakMax	97.60
L10	47.71
L30	45.58
L50	44.33
L90	42.04

Result parameters in SLM mode

Operator Name: — Operator name to enter manually on print

Signature: — Operator sign to enter manually on print

② Noise Dosimeter Measurement Report

Self-explanatory reports of ND mode are shown below.


```
ND\200116_072023.txt




Karnataka State Pollution Control Board
Date: 2020 Jan 16 07:20:23
Serial No:  SV10MM000000
GPS: 12.996077 ; 77.668861
Calibration Coef: 1.0000
Model No: S12
Accuracy : Class1
Rec.Type : SteadyNoise;
Timer : 8h; 60 times/hour
Manual Stop : Jan 16 07:20:42
-----------------------------
            RESULT (dB)
-----------------------------
Dose           0.09
TWA           39.14
PrjDose       77.82
SPL           83.30
-----------------------------
Operator Name:
-----------------------------
Signature:
```

(3) Percentile noise (Ln) report format

Ln repots is similar to the print report shown as in SLM and ND modes. In this mode results are L1, L5, L10, L30, L50, L90, L95 and L99.

5.4 Analysis Options

1) Sound level meter

① **Integral**, Select a data analysis type.

    <**SPL**>, Sound pressure level

    <**Leq**>, Sound equivalent continuous pressure level

    <**Ln**>, Percentile noise level

② **IntegratTime**, 'Integration Time' Select the integral period of Leq, Ln

    {0.1, 0.2, 0.5, 1, 2, 5, 10 seconds and recording time in Leq and Ln} *default: 0.1 sec*

③ **Freq Weight**, 'Frequency Weighting' Select a frequency weighting.

    {Z, A, B, C}, Weighting *default: A*

④ **Time Const**, 'Time Constant' To select the time constant.

    {F, S, I}, Fast, Slow, Impulse, *default : F*

2) Noise dosimeter

(1) Standard ; OSHA, ISO, selectable with <▲/▼, UP/DOWN>button

(2) Output : TWA dB(A), Dose(%), SPL(Inst), prjDose, selectable with <▲/▼, UP/DOWN>button

(3) Setup conditions, All parameters are changed by OSHA, ISO setting conditions

    ① Exchange rate; 5dB(OSHA), 3dB(ISO)

    ② Time weighting; Slow(OSHA), Fast(ISO)

    ③ Frequency weighting; A(common)

    ④ Criteria; 90dB(OSHA), 85dB(ISO)

    ⑤ Threshold; 80dB(OSHA), 75dB(ISO)

    ⑥ Display output type; Noise dose(%), TWA dB(A)

3) Percentile level

    L1, L5, L10, L30, L50, L90, L95, L99%; selectable with <▲/▼, UP/DOWN>button

5.5 Recording Options

Select the recording time option. This timer is used in 3.3 recording measurement.

1) Sound level meter

①**Rec Timer**, 'Recording Timer' To select the recording time.

{1 sec, 2 sec, 3 sec, 5 sec, 10 sec, 1 min, 5 min, 10 min, 20min, 25min, 30min, 1h, 4h, 6h, 8h, 12h, 16h and 24h }, Record for 1 second ~ 24 hours

2) Noise dosimeter etc.

Select data noise patterns and recording time

(1) Type ; Steady noise[SN], Non steady noise[nSN], Impulse noise[IN],

Selectable with <▲/▼, UP/DOWN>button

(2) Rec Per Hour ; 3, 10, 30,60 times, Selectable with <▲/▼, UP/DOWN>button

(3) Duration[nSN] ; 1, 2, 3, 4, 6, 8, 10, 12, 24 Hours, Selectable with <▲/▼, UP/DOWN>button

(4) TrigLevel[IN] ; 60, 70, 80, 90, 100, 110, 120 dB, Selectable with <▲/▼, UP/DOWN>button

(5) Timer[IN] ; 1,3, 5,10, 20, 30, 45, 60 second, Selectable with <▲/▼, UP/DOWN>button

3) Recording

(1) Steady and non-steady noise; noise Dosimeter mode

Files are saved to ND folder to SD card. Format file name: yymmdd_hhmmss.txt Result are saved to file with frequency of "Rec Per Hour" parameter in case if SPL > Threshold (fixed parameter). Duration of measurement is 1 hour for Steady mode(fixed) and "Duration[nSN]" hour for non-Steady mode.

(2) Impulse noise; noise Dosimeter mode

After click <REC> button system waits when LPeak >TrigLevel[IN] option, after that system starts real recording with frequency 1 time/sec and duration Timer[IN] sec. Files are saved to ND folder of SD. Format of file' name: yymmdd_hhmmss.txt.

(3) Percentile noise; SLM Mode

LN. Files are saved to LN folder of SD. Format of file' name: yymmdd_hhmmss.txt. Timer is selectable from SLM recording mode, Record for 1 second ~ 24 hours, result are saved to file with frequency IntegratTime (Menu/Analyzing Options/SLM)

(4) SPL & Leq; SLM Mode

Files are saved to SLM folder of SD. Format of file' name: yymmdd_hhmmss.txt

->Start Record data; press "**REC**" button; 00:00/04h:00(Displayed pattern)

(depends on Recording options 5.5-2) setting)

->Stop Record data; Repress "REC" button, Finish Recording according to setting condition

Ex) Rec Per Hour ; 10 times, Duration ; 4hr -> 00:10/04h:00 (file check; Print->5.7-2)

->Pause recording: During recording press F4, then the recording will be paused. And a symbol "===" will be shown on the top of the screen. During pause the measurement is still

going on in Arming mode but not recording to file. To come out of the pause mode, press again F4, then the recording will resume.

5.6 GPS

Display "location coordinates" on the LCD and will be printed out when user press the "Report format". During measurements, if GPS signal is available you can see a symbol "G" on screen. If GPS signal not available it will show as "N". GPS signal most probably available on outside locations only. On print reports GPS coordinates are visible only if the GPS signal is available at the beginning of recording.

1) GPS ; On, Off , Selectable with <▲/▼, UP/DOWN>button

5.7 Print

1) Basic print set up; Common 6)

2) Printing; Select Files , press print button->file will be shown, select-> press ENTER(starting print), before printing start, need to connect between S12 and printer with RS232 cable.

■ **Printing guide**

(1) File printing function is provided for Noise Dosimeter and SLM (only LN) modes.

(2) To print files of Noise Dosimeter measurements; Device should be in Noise Dosimeter mode. ->Select Menu/Print files of ND folder are displayed.
->Select file and click <Enter> button.

(3) To print files of LN measurements in SLM mode; Device should be in SLM mode, level LN.
->Select Menu/Print files of LN folder are displayed.
->Select file and click <Enter> button

(4) To print files of SLM measurements in SLM mode; Device should be in SLM mode, level Leq/SPL.
->Select Menu/Print files of SLM folder are displayed.
->Select file and click <Enter> button

6. Specifications

➢ Sound level meter kit includes: main instrument, microphone SV-MC3 and cable, instruction manual, plastic case

- Size : 190 mm x 90 mm x 30 mm (without Microphone)

- Weight : 290 g (Frontend, without Microphone)

- OS : RTOS

- CPU : ARM Cortex-M7 (300MHz)

- Memory : 32GB

- Environmental

    Operating temperature range: 0 °C to 50°C

    Storage temperature range: -20 °C to 70°C

    Humidity : 5% ~ 95% Non-condensing

- Power supply : DC 3.7V 0.4W

- Battery life : typically 32 hours, auto power off

- Time required for full charge : 6 hour

- A/D converter : 24 bit

- Displayed Sound Units

    Leq in dB

    SPL in dB

- Input Channel : 1 channel sound

- Sensor Type : IEPE

- Sample Frequency : 22.05 kHz

- Measuring range : 30~140dB - auto

- Signal to noise ratio : higher than 68 dB

- Type : Class 1 accuracy

7. Example; Result files

SLM result file -

```
SLM\210107_085851.txt
Karnataka State Pollution Control Board
Date: Jan 7 08:58:43 2021
Serial No:  SV10MM000000
GPS: nan ; nan
Calibration Coef: 1.0000
Model No: S12
Accuracy : Class1
Timer : 1200 sec
Level            : Leq (dB)
Integration time   : 1 sec
Frequency weighting: A
-------------------------------------------------------------------------------
Time(sec) LAeq[in] LAeq[avg] LAmax  LAmin  LApeakMax    L10     L30     L50     L90
00001.0    46.94    43.52    46.94  35.17    62.09    47.71   45.58   44.33   39.04
00002.0    48.57    46.80    48.96  35.17    62.09    49.71   49.58   48.33   41.04
00003.0    46.48    47.04    48.96  35.17    62.09    49.71   48.58   48.33   42.04
00004.0    56.28    47.59    56.28  35.17    85.22    49.71   48.58   47.33   43.04
00005.0    58.34    53.96    61.18  35.17    85.22    60.71   49.58   48.33   44.04
 ~...~
01199.0    43.39    62.09    86.57  35.17   104.32    64.71   57.58   47.33   43.04
01200.0    43.19    62.09    86.57  35.17   104.32    64.71   57.58   47.33   43.04
-------------------------------------------------------------------------------
Stop : 2021 Jan 7 09:18:51
-------------------------
     |   RESULT (dB)
-------------------------
LAeq[in]      43.19
LAeq[avg]     62.09
LAmax         86.57
LAmin         35.17
LApeakMax    104.32
L10           64.71
L30           57.58
L50           47.33
L90           43.04
```

ND result file –

```
ND\210205_203615.txt
Karnataka State Pollution Control Board
Date: 2021 Feb 5 20:36:15
Serial No:  SV10MM020234
GPS: nan ; nan
Calibration Coef: 1.0000
Model No: S12
Accuracy : Class1
Rec.Type : nonSteadyNoise;
Timer : 1h; 60 times/hour
----------------------------------------
Time        Dose    TWA   PrjDose    SPL
21:01:09    0.06    36.88    0.61   80.07
21:32:57    0.06    36.92    0.27   87.14
----------------------------------------
μnA 2:57    --------------------
      RESULT (dB)
-------------------
Dose         0.06
TWA          36.92
PrjDose      0.27
SPL          87.14
```

Ln mode result file -

```
LN\210202_153740.txt
Karnataka State Pollution Control Board
Date: 2021 Feb 2 15:37:33
Serial No:  SV10MM020234
GPS: nan ; nan
Calibration Coef: 1.0000
Model No: S12
Accuracy : Class1
Timer : 1800 sec
Level            : LN
Frequency weighting: B
Time weighting    : I
Integration time  : 20 sec
-------------------------------------------------------------------------
Time(sec)   L01     L05     L10     L30     L50     L90     L95     L99
00020.0   57.87   55.62   52.71   51.58   49.33   46.04   45.19   40.28
00040.0   57.87   55.62   54.71   51.58   49.33   46.04   45.19   45.28
00060.0   57.87   54.62   53.71   51.58   49.33   46.04   46.19   45.28
  ~...~
01780.0   99.87   74.62   68.71   63.58   57.33   46.04   43.19   41.28
01800.0   99.87   74.62   68.71   63.58   57.33   45.04   43.19   41.28
-------------------------------------------------------------------------
Stop : 2021 Feb 2 16:07:40
--------------------
     RESULT (dB)
--------------------
L01         99.87
L05         74.62
L10         68.71
L30         63.58
L50         57.33
L90         45.04
L95         43.19
L99         41.28
```

8. Distribution history

Date	Change history
2020.11.11	Release 1st state program for noise dosimeter
2021.02.17	SLM & Ln mode 24 hours recording, recording pause, Print report in SLM mode, Print report corrections
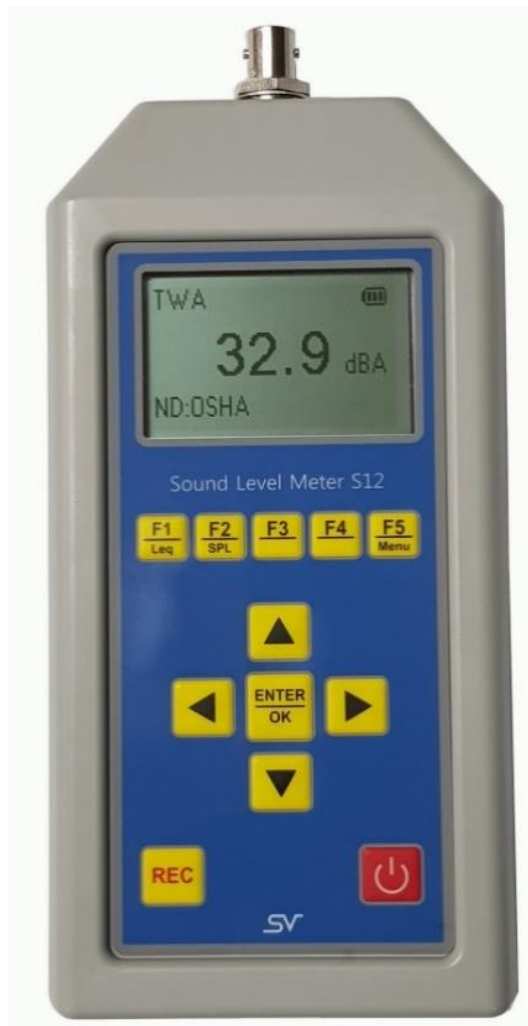
■ Appendix A. Keypad button

(1) F1 : Equivalent continuous sound pressure level / Toggle : Inst, Avg, Max, Min, Peak max

(2) F2 : Sound pressure level / RMS, Max, Min, Peak max

(3) F3 : Reset the measurement / Device reset

(4) F4 : Pause the recording and Resume the recording

(5) F5 : Menu / Back

(6) ▲, UP : Scroll up, changing value up

(7) ▼, DOWN : Scroll down, changing value down

(8) ◄, LEFT : Scroll left

(9) ▶, RIGHT : Scroll right

(10) ENTER : Start measurement without recording, select menu item, stop measurement without recording

(11) REC : Start recording measurement, stop recording measurement

■ Summary main screen

1	2	3	4
5			
6	7		

```
TWA          [▥]
  32.9 dBA
ND:OSHA
```
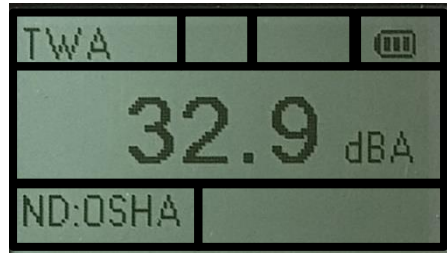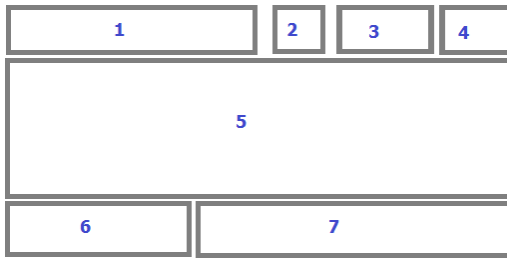
(1) Parameter is currently displayed in (5).
　　Possible parameters:
 - Noise dosimeter: SPL(inst), Dose, TWA, PrjDose (to switch use Menu/Analyzing Options/Noise
　Dosimeter)
 - SLM mode: Leq[In],Leq[Avg], Lmax, Lmin, LPeakMax, L10, L30, L0 and L90 (to switch use F1 in
SLM mode)
 - SLM mode: SPL, max, min, PeakMax, L10, L30, L0 and L90 (to switch use F2 in SLM mode)
 - Ln mode: L1, L5, L10, L30, L50, L90, L95 and L99 L90 (to switch use F1)

(2) GPS icon.
　　[G]　If GPS is switched on(Menu/GPS) and coordinates are defined
　　[N]　if GPS is switched on but GPS signal is not available
　　[　]　if GPS is not switched on in Menu

(3) state of device
　　- Stn, Arm, Rec, empty (stop)
　　- Shows "===" in case of F4 press during recording, if F4 is press again it resumes recording
and show Rec

(4) Battery state.
　　- Battery symbol is divided into three parts/bars. Full battery shows all bars. No bar means
empty battery. During charging this bars will be blinking.

(5) Results

(6) Mode.
 - SLM;
 - ND:OSHA (Noise Dosimeter, standard OSHA)
 - ND:ISO (Noise Dosimeter, standard ISO)

(7) Time or File Name info.
 - Noise Dosimeter mode: info about current recording time and full time of measurement;
　If recording type as "Steady" and "Non-Steady" – format of time is hh:mm. For "Impulse
　Noise": mm:ss.
 - SLM: info about name of recorded file

■ Measurement(START)

(1) Standby (Stn): system waits 10 seconds for the signal to stabilize; starts after stop state before
　arming or recording.

(2) Arming (Arm): analyzing without saving results; Press < Enter > button to start and again < Enter > button to stop.

(3) Recording (REC): analyzing with saving of result to SD; Press <REC> button to start and again <REC> button to stop.

(4) Stop state: no signal receiving. In this state battery charge is saved. To get <Stop> state use <Enter> button in "Standby" and "Arming" modes or <Rec> button in "Recording" mode.