

# Baseline Environmental Monitoring, Program 5: Noise Monitoring – Exploration Permit #51985 at Puhipuhi, Northland

Evolution Mining NZ Pty Ltd

# Baseline Environmental Monitoring, Program 5: Noise Monitoring – Exploration Permit #51985 at Puhipuhi, Northland

✦ Prepared for

Evolution Mining NZ Pty Ltd

✦ January 2017



**PATTLE DELAMORE PARTNERS LTD**  
295 Blenheim Road  
Upper Riccarton, Christchurch 8041  
PO Box 389, Christchurch 8140, New Zealand

Tel +64 3 345 7100 Fax +64 3 345 7101  
Website <http://www.pdp.co.nz>  
Auckland Tauranga Wellington Christchurch



**solutions** for your environment

## Quality Control Sheet

TITLE Baseline Environmental Monitoring, Program 5: Noise Monitoring – Exploration  
Permit #51985 at Puhipuhi, Northland

CLIENT Evolution Mining NZ Pty Ltd

VERSION Final

ISSUE DATE 19 January 2017

JOB REFERENCE A02982804

SOURCE FILE(S) A02982804\_R001\_Noise Monitoring Program Final

### DOCUMENT CONTRIBUTORS

Prepared by

SIGNATURE



Steve Pearce

Reviewed by

Approved by

SIGNATURE



Mark Ellis



Eoghan O'Neill

### Limitations:

This report has been prepared by Pattle Delamore Partners Limited (PDP) on the basis of information provided by Evolution Mining NZ Pty Ltd. PDP has not independently verified the provided information and has relied upon it being accurate and sufficient for use by PDP in preparing the report. PDP accepts no responsibility for errors or omissions in, or the currency or sufficiency of, the provided information.

This report has been prepared by PDP on the specific instructions of Evolution Mining for the limited purposes described in the report. PDP accepts no liability if the report is used for a different purpose or if it is used or relied on by any other person. Any such use or reliance will be solely at their own risk.

## Executive Summary

Evolution Mining NZ Pty Ltd (ENZ) is the holder of Mineral Exploration Permit 51985 which covers 2,984 Ha near Puhipuhi, Northland which is prospective for both gold and silver.

The area is geothermal in origin and has a history of being mined for mercury which is present in the area in the form of cinnabar (a mineralised form of mercury sulphide, HgS).

Pattle Delamore Partners Ltd (PDP) has been engaged by ENZ, to undertake baseline environmental monitoring, and to prepare an Environmental Management Strategy for Exploration Drilling<sup>1</sup>. This strategy includes various recommendations to minimise and mitigate potential noise effects. Noise monitoring will allow the effectiveness of the management plans and noise mitigation to be assessed. If necessary, the management plans and/or noise mitigation measures can be revised to improve the management of noise.

On the 5 July 2016 sound level<sup>2</sup> monitoring at three locations close to the exploration drill rig in ENZ's Puhipuhi exploration tenement was completed.

Two of the measurement locations were close to houses (SM-1 and SM-2) which are likely to be the most sensitive nearby receptors with a third location (SM-3) downwind of, and in line of sight of, the drill rig to provide a worst case sound level measurement.

From sound level measurements it was estimated that the sound pressure in the vicinity of the drill rig would be approximately 90 dB  $L_{Aeq(15)}$  which is reasonable for a location close to an internal combustion engine.

It was assessed that at a distance of approximately 320 m the sound level from the operating drill rig would have reduced from approximately 90 dB  $L_{Aeq(15)}$  to the 40 dB  $L_{Aeq(15)}$  limit specified in the Whangarei District Plan. A sound level of 40 dB  $L_{Aeq(15)}$  is similar to the hum created by a refrigerator.

Based on the 5 July 2016 sound level monitoring it was concluded that the two sites SM-1 and SM-2, that were located 1,000 m and 1,400 m respectively from the drill rig, were not impacted by noise from the drill rig.

It is recommended that in order to meet the Whangarei District Plan noise rule without any engineered noise minimisation solutions, the drill rig should be located at least 320 m from a residential property boundary.

---

<sup>1</sup> Environmental Management Strategy for Exploration Drilling, PDP, 2016

<sup>2</sup> Sound is what we hear. Noise is unwanted sound. Sound is measured in term of sound pressure levels (dB)

If a drill pad location closer to a residential property boundary is required, it is highly likely that some engineered noise minimisation solutions would be required.

## Table of Contents

SECTION	PAGE
<b>Executive Summary</b>	<b>ii</b>
<b>1.0 Introduction</b>	<b>1</b>
<b>2.0 Environmental Management Strategy for Exploration Drilling</b>	<b>1</b>
<b>3.0 Background</b>	<b>2</b>
<b>4.0 Relevant standards</b>	<b>3</b>
<b>5.0 Relevant District Plan Rules</b>	<b>3</b>
<b>6.0 Sound Level Meter</b>	<b>4</b>
<b>6.1 Sound Level Meter Setup</b>	<b>4</b>
<b>7.0 Sound Level Measurements</b>	<b>5</b>
<b>7.1 Meteorological conditions</b>	<b>5</b>
<b>8.0 Monitoring results and discussion</b>	<b>8</b>
<b>8.1 SM-3</b>	<b>9</b>
<b>8.2 SM-1</b>	<b>10</b>
<b>8.3 SM-2</b>	<b>10</b>
<b>9.0 Summary and conclusion</b>	<b>11</b>

## Table of Figures

Figure 1: dBA Scale (Rotorua District Council)	3
Figure 2: Sound meter mounted on tripod	5
Figure 3: Sound measurement locations	7

## Table of Tables

Table 1: Monitoring times	8
Table 2: Monitoring results	8

## Appendix

Appendix A: Rion NL-52 Class 1 Sound Level Meter Technical Specifications

## 1.0 Introduction

Evolution Mining NZ Pty Ltd (ENZ) is the holder of Mineral Exploration Permit 51985 which covers 2,984 Ha near Puhipuhi, Northland which is prospective for both gold and silver.

The area is geothermal in origin and has a history of being mined for mercury which is present in the area in the form of cinnabar (a mineralised form of mercury (II) sulphide, HgS).

Through consultation with the local community ENZ is aware that local stakeholders are concerned about potential environmental effects of exploration and the prospect of future mining within the permit area.

ENZ has initiated a number of baseline environmental studies to supplement historical environmental assessments. The purpose of this is twofold; first to address, manage and monitor concerns with current exploration activities, and secondly provide data and information to inform the management of any future exploration or mining activities.

The purpose of this document is to report on recent noise monitoring that was undertaken during exploration drilling.

## 2.0 Environmental Management Strategy for Exploration Drilling

An Environmental Management Strategy for Exploration Drilling was previously developed<sup>3</sup>.

The philosophy behind the strategy is one of identifying potential environmental risks then, when developing the exploration drilling program:

- ✧ Eliminate;
- ✧ Isolate; or
- ✧ Minimise the risks.

Management plans are used to prescribe how various exploration activities are to be carried out in order to ensure that any identified environmental risks are minimised or managed.

Monitoring is used to assess the effectiveness or otherwise of the management plans, and if necessary, the management plans include provision for the plan to be reviewed along with the mitigation or minimisation controls.

---

<sup>3</sup> Environmental Management Strategy for Exploration Drilling, PDP, 2016

The primary source of noise from the operation of a drill rig will be that from the diesel engine which powers the pumps and hydraulics. There may also be noise sources, such as clangs and bangs that occur in making up and breaking out the drill string, however these are intermittent events.

The engine noise is generally not an issue in the rural environment in which the drilling program is located. However the 24-hour drill operation, prolonged duration of each drill hole and possible drill hole location in close proximity to a farm / rural residence may result in nuisance noise.

While it is expected that drilling noise will meet Whangarei District Plan limits, it is recognised that sensitivity to noise can vary. Recommendations made in the management strategy to mitigate neighbours' sensitivity to noise include:

- ✧ It is recommended that the impact of drill rig noise be **minimised** by location of drill holes away from residences (if possible);
- ✧ Drillers should be deterred from unnecessary hammering and clash of drill string and rig as much as is practical; and
- ✧ Consideration should be given to the use of engineered solutions for noise minimisation.

### 3.0 Background<sup>4</sup>

Noise is often commonly defined as unwanted sound.

Sound is produced by small fluctuations in air pressure. As an example, the sound from a drum results from fluctuations in air pressure caused by the movement or vibration of the drum hide. The eardrum is able to perceive these fluctuations with great sensitivity.

The loudness of a sound is predominantly related to the size of the fluctuations, but is also related to their frequency, or the rate at which they are produced.

To ensure measured levels approximate the human response, a weighting scale is used. It is known as the 'A' scale and the units are referred to as 'A-weighted decibels' and written as dB(A). The dB(A) scale discriminates between sounds in much the same way as people do.

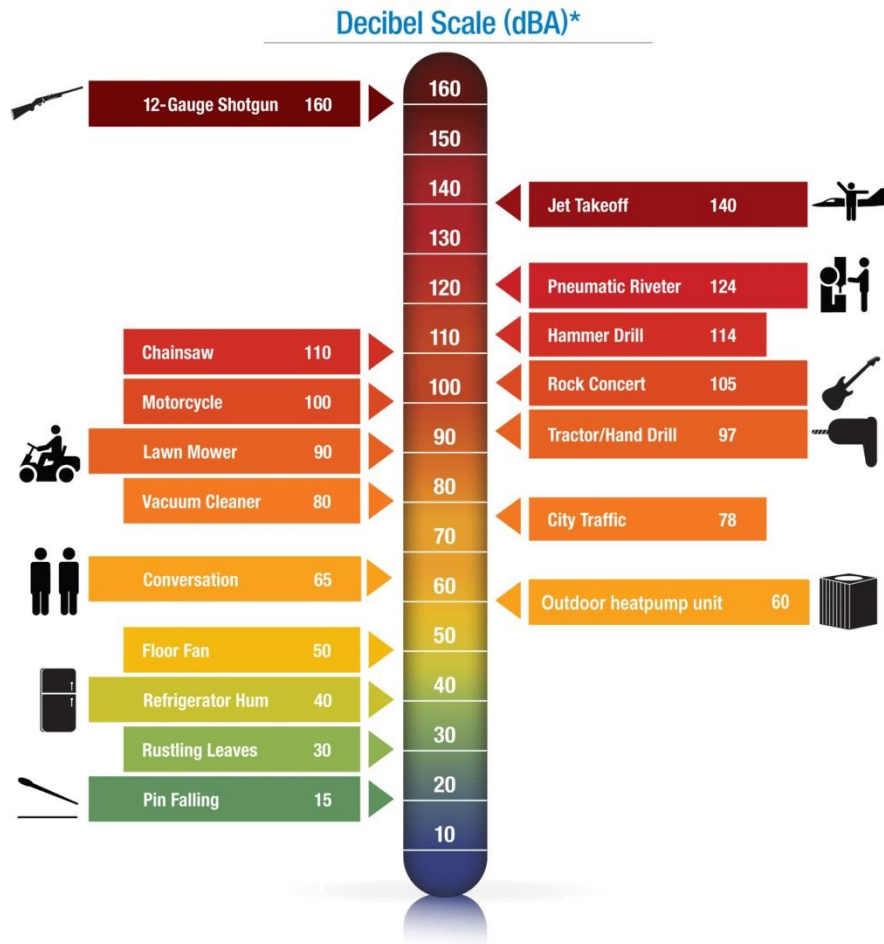
**Figure 1** below shows the sound levels corresponding to a number of common activities.

All field sound level measurements were made using the 'A' weighted scale.

---

<sup>4</sup> Guidelines for the Use of the Environment Protection (Noise) Policy 2007, South Australia EPA, June 2009





**Figure 1: dBA Scale (Rotorua District Council)**

#### 4.0 Relevant standards

The relevant standards for sound measurement and assessment in New Zealand are as follows:

- ✧ NZS 6801:2008 Acoustics – Measurement of Environmental Sound
- ✧ NZS 6802:2008 Acoustics – Environmental Noise

The sound level measurements and subsequent assessment in this document has been completed in general accordance with these standards.

#### 5.0 Relevant District Plan Rules

The Whangarei District Plan (Part B – Introduction – NAV – Noise and Vibration) contains specific rules regarding permitted levels of noise that can be generated. Specifically that the activity must adhere to the following:

*Rule NAV.6.1 – Noise Arising from Activities within Environments states that the following limits may not be exceeded, as measured at any point within the applicable boundary:*

- ✧ 50 dB  $L_{Aeq}$  between the hours of 0700 and 2200; and
- ✧ 40 dB  $L_{Aeq}$ , and 70 dB  $L_{AFmax}$ , between the hours of 2200 and 0700.<sup>5</sup>

As drilling occurs on a 24-hour basis, the lower limit value of 40 dB  $L_{Aeq}$  applies. A sound level of 40 dB  $L_{Aeq(15)}$  is similar to the hum created by a refrigerator (see **Figure 1**).

## 6.0 Sound Level Meter

Sound level measurements on-site were taken with a Rion NL-52 sound level meter. The Rion NL-52 is a Class 1 rated instrument that meets the requirements of NZS 6801:2008 Acoustics – Measurement of Environmental Sound.

The technical specifications of the Rion NL-52 sound level meter can be found in Appendix A.

### 6.1 Sound Level Meter Setup

In order to take level sound measurements, the sound level meter was mounted on a tripod between 1.2 and 1.5m off the ground and positioned at least 3.5m away from any reflecting surface such as a car or building as per the requirements of NZS 6801:2008. An example of the sound meter measurement setup used is shown below in **Figure 2**.

<sup>5</sup>  $L_{Aeq(t)}$  refers to the time-average A-weighted sound pressure level over a specified period of time, t (minutes). 15 minutes is recommended by NZS 6802:2008

$L_{AFmax}$  refers to the maximum A-weighted & F-weighted sound pressure levels



**Figure 2: Sound meter mounted on tripod**

The sound level meter was also fitted with a WS-10 windscreen to reduce wind noise.

## **7.0 Sound Level Measurements**

The aim of the sound level monitoring was to assess the impact of the exploration drilling on noise levels in the area surrounding the drill rig.

### **7.1 Meteorological conditions**

The sound level monitoring was completed on the 5 July 2016.

The day was fine with only a few clouds present. There was fog early in the morning which had cleared prior to measurements being undertaken.

The temperature varied between 10-15°C. There was no obvious temperature inversion layer present that could affect sound propagation.

Wind, when present, was very light, blew from the south southeast to south southwest and was estimated to vary between 0 and 2.5 m/s.

Three sound level measurement locations were chosen. Two of these were close to houses (SM-1 and SM-2) which are likely to be the most sensitive nearby receptors. As the wind was blowing from the southerly quarter, a third location (SM-3) downwind of, and in line of sight of, the drill rig was also chosen to

provide an indication of the likely worst case sound level measurements from the exploration drilling activity on that day. The sound measurement locations shown below in **Figure 3** are described in further detail below.

#### 7.1.1 Location SM-1

SM-1 is located approximately 1,000 m northwest of the drill rig location and is approximately 80 m higher in elevation. There is a valley and a number of trees between the drill rig and the monitoring location.

The nearest road is approximately 120 m away from the monitoring location.

#### 7.1.2 Location SM-2

SM-2 is located on Mine Road approximately 1,400 m southwest of the drill rig location and is approximately 40 m lower in elevation. There is a ridge and shallow valley between the drill rig and the monitoring site.

#### 7.1.3 Location SM-3

SM-3 is located approximately 60m to the north northwest of the drill rig location and is approximately 5m higher in elevation. There is no sound impeding topography or features between the drill rig and the monitoring site.

The nearest road is approximately 950 m away from the monitoring location.



**Figure 3: Sound measurement locations**

## 8.0 Monitoring results and discussion

On the day of sound level monitoring the drill rig was close to reaching the maximum depth of the hole that it was drilling. Consequently the sound originating from the drill rig was close to the loudest likely as the drill rig was working under high load due to the hole depth. The rig operating sound measurements at all locations were taken first then the rig turned off and the measurements repeated. The measurement times are given below in **Table 1**.

Table 1: Monitoring times		
Location	Rig operating status	Measurement Time
SM-1	Operating	10.50 am
	Not operating	1.15 pm
SM-2	Operating	11.10 am
	Not operating	1.45 pm
SM-3	Operating	11.55 am
	Not operating	12.30 pm

The measured sound readings are presented below in **Table 2**.

Table 2: Monitoring results				
Location	Rig operating status	Wind Speed	L <sub>Aeq(15)</sub> (dB)	L <sub>AFmax</sub> (dB)
SM-1	Operating	2.5 m/s from SSE	46.5	66.6
	Not operating	2.5 m/s from S	35.3	62.5
SM-2	Operating	0.5 m/s from SSE	57.7	81.0
	Not operating	0 m/s	56.7	80.6
SM-3	Operating	2.5 m/s from SSW	60.1	80.1
	Not operating	2.5 m/s from SSW	40.3	53.7



## 8.1 SM-3

During the period in which both sound level measurements were taken there were no nearby sound sources (such as close bird noises or vehicle noise) noted apart from the drill rig and its radio. The two sound measurements (rig operating and not) were taken consecutively with the only change in noise environment being the drill rig operation.

Sound level pressures reduce as you move further away from the source of the sound. **Equation 1** below indicates that sound pressure levels decrease as the distance from the source increases<sup>6</sup>.

$$A_{div} = 20 \log \left( \frac{r}{r_0} \right) \quad \text{Equation 1}$$

Where:

$A_{div}$  = attenuation due to divergence (dB)

$r$  = the distance from the point source (m)

$r_0$  = a reference distance (usually 1 m)

At a distance of 60 m downwind from the operating drill rig the measured sound pressure level was 60.1 dB  $L_{Aeq(15)}$ . From **Equation 1** at 60 m from the drill rig the expected reduction in sound pressure level is 35.6 dB  $L_{Aeq(15)}$  from which it can be inferred that the sound pressure level at 1 m from the drill rig would be 95.7 dB  $L_{Aeq(15)}$  (60.1 + 35.6 = 95.7). As sound propagation is enhanced in the direction of wind flow, and SM-3 is elevated compared to the drill rig, this estimation of sound pressure level from the drill rig will be greater than the actual value. A sound pressure level at the drill rig of 90 dB  $L_{Aeq(15)}$  is assumed.

Sound pressure levels of 90 – 100 dB  $L_{Aeq(15)}$  are commonly experienced close to engines such as those used to power a drilling rig. Given the small size of the drill rig, an estimate of the sound pressure level close to the drill rig of approximately 90 dB  $L_{Aeq(15)}$  is reasonable. This is equivalent to the sound pressure level experienced standing next to a lawnmower.

In order to comply with the Whangarei District Plan Rule NAV 6.1 (see Section 5.0 above), the sound pressure level between the hours of 2200 and 0700 at the applicable boundary must be at or below of 40 dB  $L_{Aeq}$ .

From **Equation 1**, a reduction of the drill rig sound pressure level from 90 dB  $L_{Aeq(15)}$  at the drill rig to 40 dB  $L_{Aeq(15)}$  would be expected to be observed at a distance of approximately 320 m from the drill rig.

<sup>6</sup> NZS 6801:2008, “Acoustics – Measurement of environmental sound”, Appendix C – Propagation of sound Outdoors, Equation 11

Thus at distances greater than approximately 320 m from the drill rig the sound pressure would be expected to be below 40 dB  $L_{Aeq(15)}$  and in turn would be expected to comply with the Whangarei District Plan Rule NAV 6.1 between the hours of 2200 and 0700.

## 8.2 SM-1

Location SM-1 is approximately 1,000 m distant from the drilling rig and is approximately 80 m higher in elevation with a valley and a number of trees in the in between.

Applying **Equation 1** at 1,000 m from the drill rig, the expected reduction in sound pressure level is 60 dB  $L_{Aeq(15)}$  which implies a sound pressure level from the drill rig of approximately 30 dB  $L_{Aeq(15)}$  at SM-1.

The measured sound level at SM-1 while the rig was operating was 46.5 dB  $L_{Aeq(15)}$  which is above the expected sound pressure level of 30 dB  $L_{Aeq(15)}$  so it is likely that the increase is due to the localised noise sources close to SM-1.

A chicken run was located close by this monitoring location (10m) and there was sound from the chickens and magpies during the monitoring periods. The chickens were observed to be more vocal during the rig operating measurement than during the rig not operating measurement and are likely to be the cause of the higher sound measurement reading.

Based on the analysis above it is concluded that location SM-1 was not impacted by noise from the operation of the drill rig.

## 8.3 SM-2

SM-2 is located on Mine Road approximately 1,400 m southwest of the drill rig location and approximately 40 m lower in elevation. There is a ridge and shallow valley between the drill rig and the monitoring site.

Applying **Equation 1** at 1,400 m from the drill rig, the expected reduction in sound pressure level is 62.9 dB  $L_{Aeq(15)}$  which implies a sound pressure level from the drill rig of approximately 27.1 dB  $L_{Aeq(15)}$  at SM-2.

The measured sound pressure level at SM-2 while the rig was operating was 57.7 dB  $L_{Aeq(15)}$  which is above the expected sound pressure level of 27.1 dB  $L_{Aeq(15)}$  so, as with SM-1, it is likely that this increase is due to the localised noise sources close to SM-2 (predominantly vehicles, insects and birds).

It was noted that the measured background sound pressure level at SM-2 of 56.7 dB  $L_{Aeq(15)}$  when the drill rig was not operating was already above the level specified in the Whangarei District Plan Rule NAV 6.1 (see Section 5.0 above) of 50 dB  $L_{Aeq}$  between the hours of 0700 and 2200 at the applicable boundary.



Due to its location on Mine Rd, during both sound measurements (drill rig operating and not operating) logging trucks went past causing short term increases in sound (1 truck while the rig was operating and 2 trucks when the rig was shut down). These truck movements would be responsible for the 80.6 and 81.0 dB  $L_{AFmax}$  sound values recorded.

Based on the analysis above it is concluded that location SM-2 was not impacted by noise from the operation of the drill rig.

## 9.0 Summary and conclusion

Sound monitoring was undertaken at three locations close to the exploration drill rig in ENZ's Puhipuhi exploration tenement on the 5 July 2016.

Two of the measurement locations were close to houses (SM-1 and SM-2) which are likely to be the most sensitive nearby receptors with a third location (SM-3) downwind of, and in line of sight of, the drill rig to provide a worst case sound level measurement for that day.

From sound level measurements made at SM-3 it was estimated that the sound pressure at 1 m from the drill rig would be approximately 90 dB  $L_{Aeq(15)}$  which is reasonable for a location close to an internal combustion engine.

It was estimated that at a distance of approximately 320 m from the drill rig the sound level from the operating drill rig would have reduced from approximately 90 dB  $L_{Aeq(15)}$  to the 40 dB  $L_{Aeq(15)}$  limit specified in the Whangarei District Plan Rule NAV 6.1.

It was concluded that the other two sites SM-1 and SM-2 that were located 1,000 m and 1,400 m respectively from the drill rig were not impacted by noise from the drill rig.

It is recommended that in order to meet the applicable Whangarei District Plan Rule NAV 6.1 without any engineered noise minimisation solutions, the drill rig should be located at least 320m from a property boundary.

If a drill pad location closer to a boundary is required, engineered noise minimisation solutions should be considered.

**Appendix A**

Rion NL-52 Class 1 Sound Level Meter  
Technical Specifications

Sound Level Meter Class1 NL-52  
Sound Level Meter Class2 NL-42

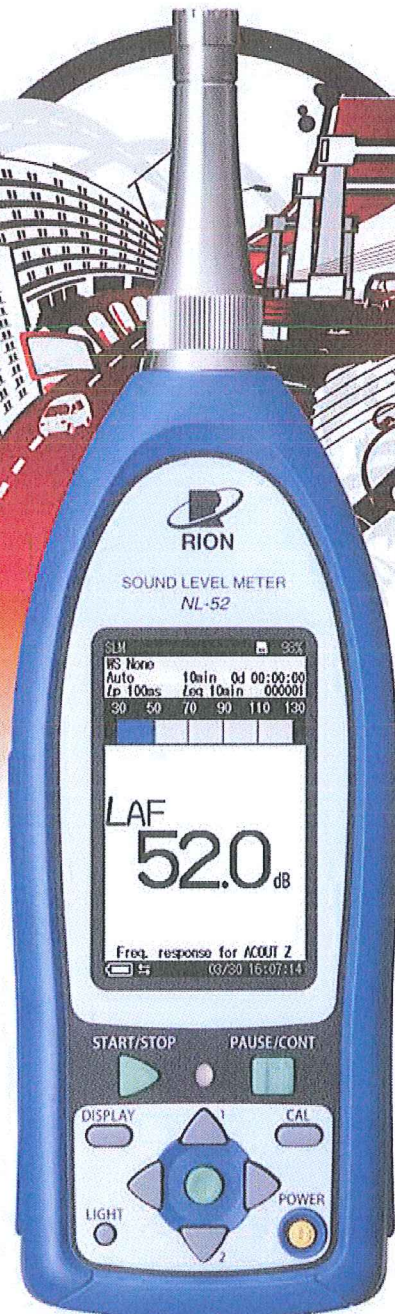


# Measure Sounds Reliably

Sound Level Meter  
Class1  
**NL-52**

Sound Level Meter  
Class2  
**NL-42**

**Free trial  
optional programs**  
now available on  
our website



<http://svmeas.rion.co.jp/>



# Extremely user friendly ! Rion's NL-52 and NL-42 sound level meters provide full support for the measurement process.

The NL-52 and NL-42 were developed to eliminate the trouble of reading instruction manuals when conducting measurements. Large and easily viewable three-inch LCD color display. The unit (except for the microphone) is water-resistant, which means that it is unaffected by sudden rain showers. You can use rechargeable batteries to help cut down on waste, making this an environmentally friendly product.

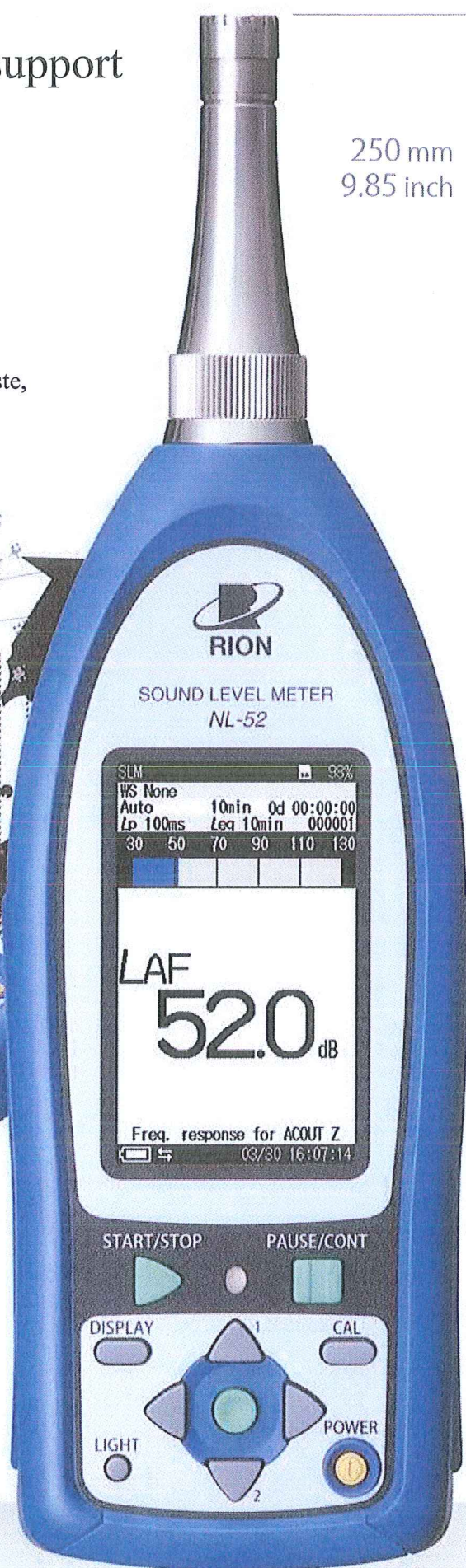
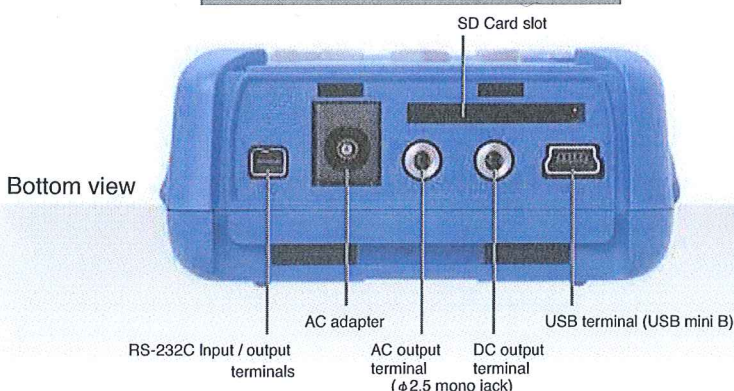


Equipped with non-slip rubber grips

## Large color LCD screen

Three-inch LCD screen with a touch panel  
High resolution screen is easy to see indoors or outdoors and even in the dark.

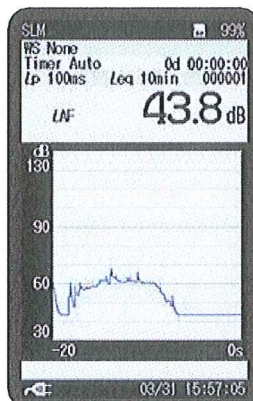
Variety of I/O Connections



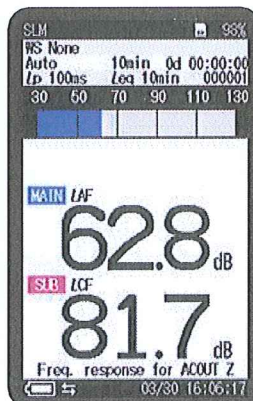


## No paper manual is needed.

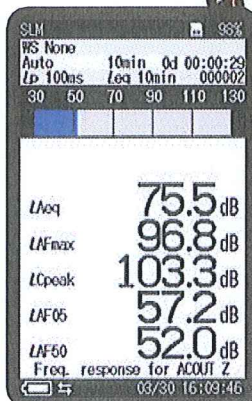
User instructions and a help function can be easily accessed on the device.



Measurement Display  
(Level-Time graph)



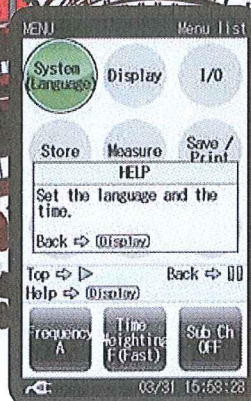
Measurement Display  
(Simultaneous display of  
Main and Sub channel)



Parameter Screen



Menu screen



Help screen

## Water-resistant (Except for the microphone)

Guaranteed water-resistant to at least level  
IP54 (resistant to spraying water).  
Helps reduce failures caused by sudden rain showers.



\* Mounting the All-weather windscreen or rainproof windscreen helps raise the water-resistant performance of the entire unit, so that the microphone will meet IPX3 specifications.

## Use of rechargeable batteries

In these new models it is possible to use rechargeable batteries which make these meters environmentally-friendly. 24 hour continuous measurement is possible (when using eneloop® or dry alkaline batteries).



- Please use the dedicated charger to charged eneloop® batteries.
- When using eneloop batteries, please read the eneloop® battery instruction manual.
- eneloop® is a registered trademark of Panasonic group.

## Continuous detailed measurements for one month

This meter can be used to conduct long-term measurements, such as environmental measurements.  
(If an AC adapter is used)

Duration of recording

NL-52/42

1000 h (approx. one month)

Previous model

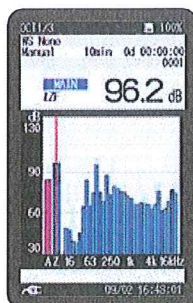
200 h (approx. one week)

Example of detailed recording

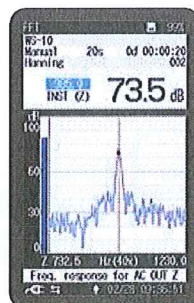
If the  $L_p$  is measured at 100 ms intervals and the  $L_{eq}$  is simultaneously measured at 10 min intervals over a 24 h period, the total size of accumulated data is approximately 74 MB (reference value)

## Functionality can be extended by a range of options

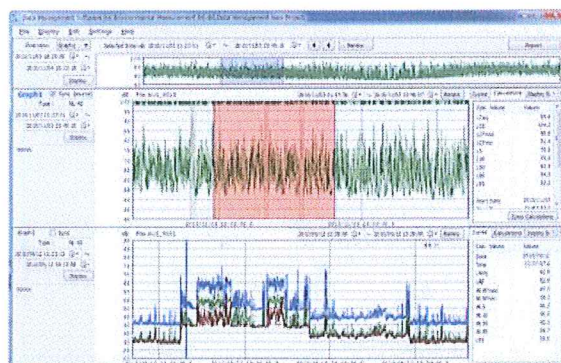
Additional functions can be added, such as simultaneous logging of raw data (100 ms  $L_p$ ) and processed data ( $L_{eq}$  and other indices), frequency analysis reverberation time measurement and long-term data recording.



1/3 octave band  
analysis screen



FFT analysis screen  
(x40)



Data management screen of AS-60 software



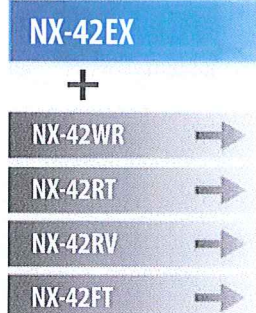
# Optional program function list

When the optional programs are installed, the following functions are added:

## Extended function program NX-42EX

### Prepares for other programs

When NX-42EX is installed\*,  
NX-42WR, NX-42RT, NX-42RV  
and NX-42FT can be added.



\*The NX-42EX program cannot be uninstalled.



The NX-42EX is supplied on the 512 MB SD card. The 512 MB SD card can be used as a memory card after installing the program.

## NX-42EX

Auto store function (instantaneous value, processed value)

Comparator function

Continuous data output function

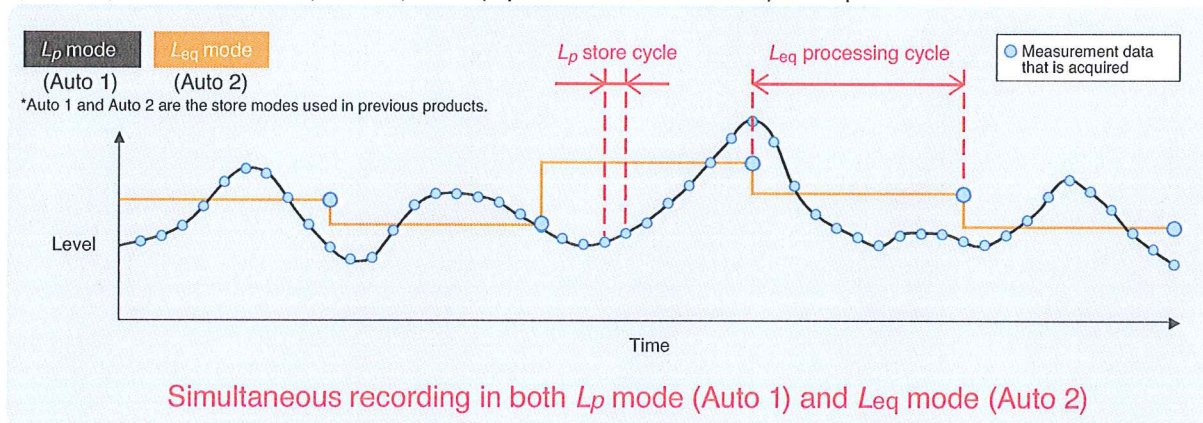
Program type	NX-42WR	NX-42RT	NX-42FT	NX-42RV
Additional function				
Real sound monitor (waveform recording)	●			
Octave, 1/3 octave band analysis		●		
Octave, 1/3 octave band filter output		●		
FFT analysis			●	
Reverberation Time Measurement				●

### Auto store function

This function enables continuous measurement in  $L_p$  mode (instantaneous SPL) and  $L_{eq}$  mode (equivalent continuous SPL) to be conducted simultaneously.

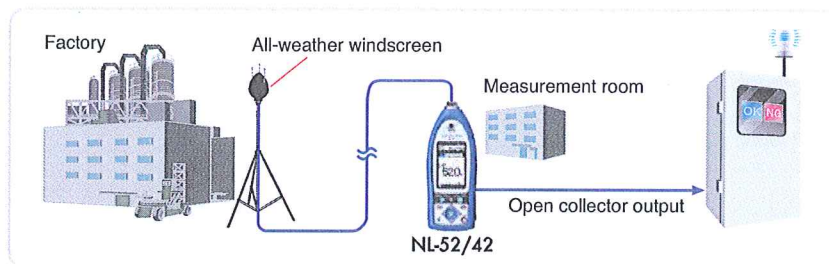
Total measuring time of Auto store function Up to 1000 h Equipped with a timer function

$L_p$  mode (instantaneous SPL) and  $L_{eq}$  mode (equivalent continuous SPL) concept



### Comparator function

This function turns on when the open collector output exceeds the set value (max. applied voltage 24 V, max. current 60 mA, allowable dissipation 300 mW).



### Continuous data output function

This function enables the continuous acquisition of instantaneous values and processed values during both USB and RS-232C communication.

This is a convenient function for users who can design their own control programs, where data has to be transferred continuously from the sound level meter to the computer.



## Waveform recording program NX-42WR



The NX-42WR is supplied on the 2 GB SD card. The 2 GB SD card can be used as a memory card after installing the program.



This function enables users to record sounds and to process sound levels simultaneously. Recorded data can be played on computer and used for frequency analysis.

(Uncompressed waveform WAVE file)

Sampling at 48 kHz, 24 kHz, 12 kHz, Selection of 24 bit or 16 bit

Maximum recording time (16 bit)

Sampling frequency	Memory card	
	512 MB	2 GB
48 kHz	1 h	4 h
24 kHz	2 h	8 h
12 kHz	4 h	16 h

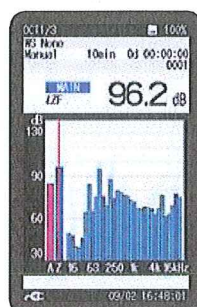
## Octave, 1/3 octave real-time analysis program NX-42RT



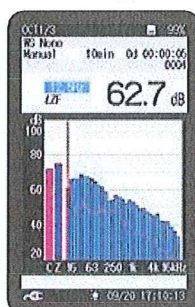
The NX-42RT is supplied on the 512 MB SD card. The 512 MB SD card can be used as a memory card after installing the program.



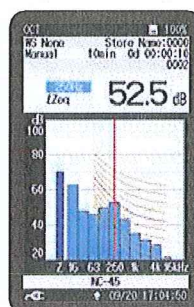
By adding the NX-42RT program to the NL-52/NL-42, octave band and 1/3 octave band analysis can be performed. Saved analysis results can be loaded and shown in an overlay graph display together with current analysis data. NC curve graph display and NC value calculation/display are also possible. Using the AS-60RT software, data can be utilized and managed on a computer.



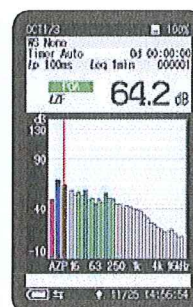
1/3 octave band analysis screen



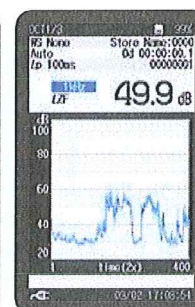
Overlay analysis screen



NC curve screen



Partial over all screen



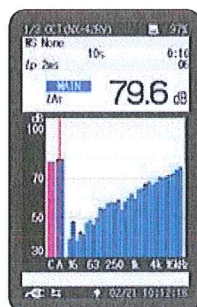
Measurement screen (Level-Time graph)

## Reverberation Time Measurement Program NX-42RV

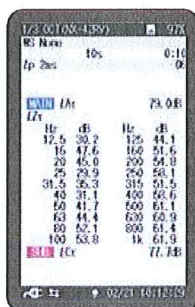


The NX-42RV is supplied on the 512 MB SD card. The 512 MB SD card can be used as a memory card after installing the program.

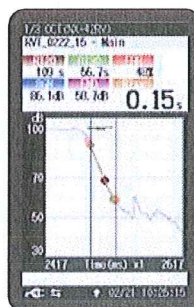
By adding the NX-42RV program to the NL-52/42, reverberation time measurements can be performed. The measurement method is the interrupted noise method. This program allows storage of reverberation time decay curves, T20/T30 calculation, Txx calculation (reverberation time calculation based on a user-defined interval) and averaged reverberation time results displayed on the SLM screen.



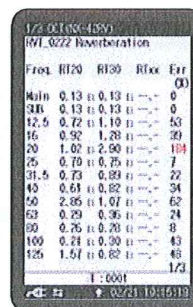
Measuring screen (graph)



Measuring screen (numeric)



Reverberation time decay curve screen



Result screen (T20/T30/Txx)

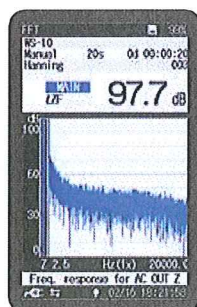
## FFT analysis program NX-42FT



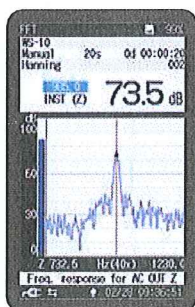
The NX-42FT is supplied on the 512 MB SD card. The 512 MB SD card can be used as a memory card after installing the program.



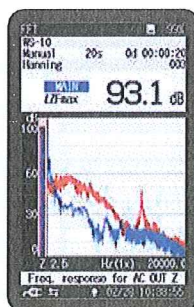
By adding the NX-42FT program to the NL-52/NL-42, FFT analysis can be performed. The analysis frequency range is 20 kHz, with 8 000 spectrum lines (200 displayed). Saved analysis results can be loaded and shown in an overlay graph display together with current analysis data. Maximum zoom ratio is x40, and the top list screen can show up to 20 lines.



Analysis screen (x1)



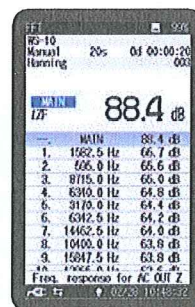
Analysis screen (x40)



Overlay analysis screen



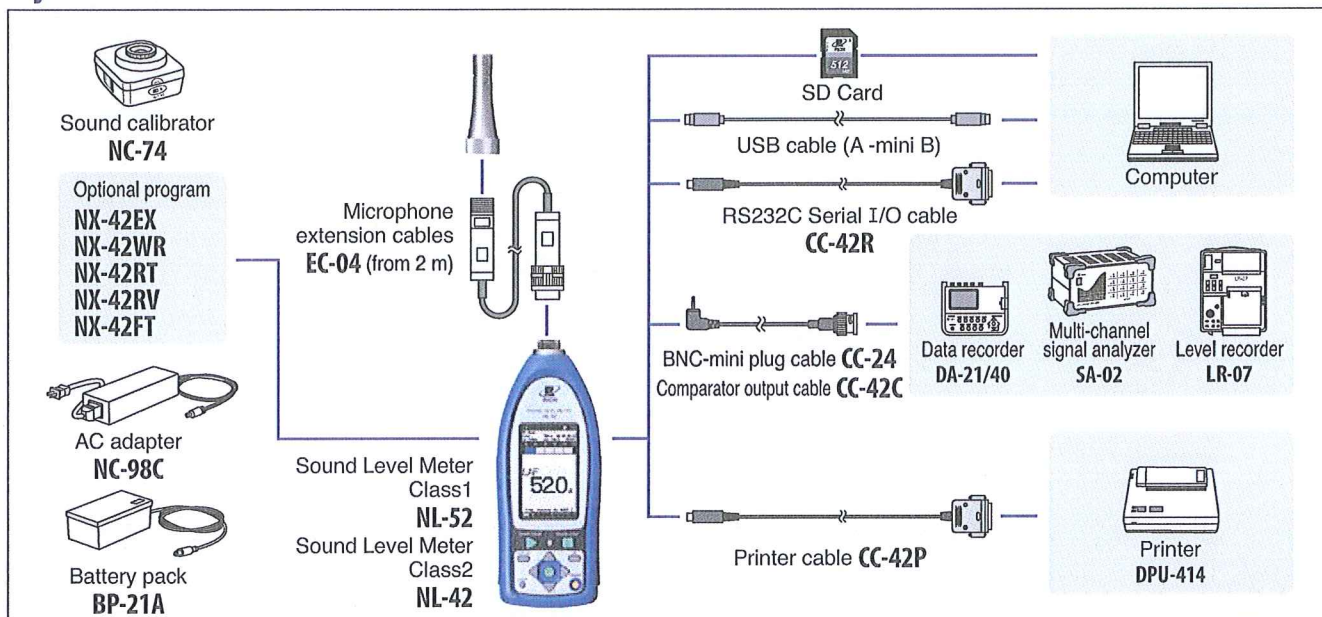
Linear average screen



Top list screen

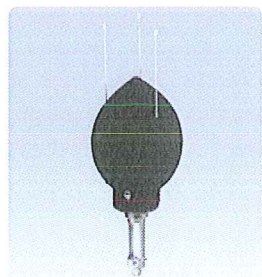


## System construction



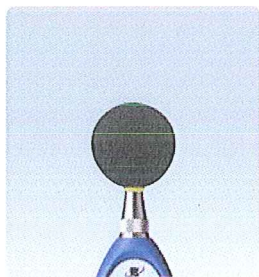
## Peripheral devices

### All-weather windscreen WS-15



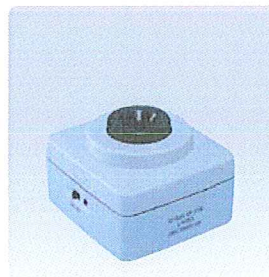
This windscreen is designed for outdoor installations. It helps to reduce wind noise and is equipped with rainproof features that satisfy the **IPX3 water-resistant** specifications. It is used with a microphone extension cable. (Mounting adapter WS15006 required separately)

### Rain-protection windscreen WS-16



This screen protects the microphone against rain for a short period of time. The rainproof performance of this windscreen is designed to satisfy the **IPX3 water-resistant** specifications.

### Sound calibrator NC-74



This Sound calibrator conforms to IEC 60942 (JIS C 1515), Class 1, providing a level of performance sufficient for calibrating the precision sound level meter.

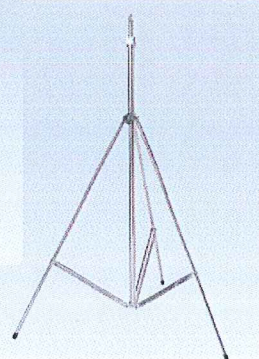
Specifications	
Nominal acoustic pressure level	94 dB
Nominal frequency	1 kHz

### Tripod

This stand can be used for general acoustic measurements. The sound level meter and microphone can be mounted on the stand.



ST-80



ST-81

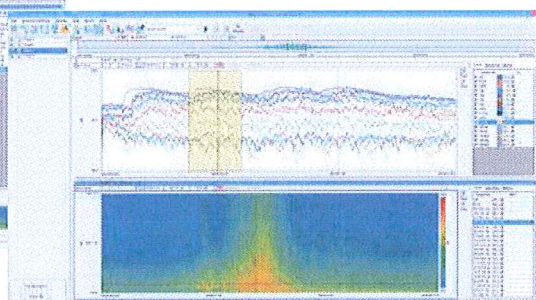
(For All-weather windscreen WS-15, use of ST-81 is recommended.)

## Waveform analysis software AS-70

This software allows you to load stored WAVE files from a RION sound level meter, vibration meter or data recorder. Octave, 1/3 octave, and FFT analyses can then be performed. Playback of the real sound files is also possible.



Frequency analysis screen



Frequency analysis screen

### Specifications

Waveform analysis	Calculations	Maximum value, Minimum value, Average value, RMS, Variance, Differential and integral calculus, HPF, LPF
Frequency weighting		Z, A, C, G, C to A, L <sub>v</sub> (vertical) (JIS C 1510), L <sub>h</sub> (horizontal) (JIS C 1510)
FFT analysis	Analysis points	32 to 65 536 points
	Display data	Power spectrum, Power spectral density, Spectrogram
Time weighting		10 ms, F, 630 ms, S, 10 s
Octave band analysis	Applicable standards	IEC 61260 Class 1 (JIS C 1514 Class 1)
	Analysis frequency range	Octave band 0.5 Hz to 16 kHz (16 bands) 1/3 octave band 0.4 Hz to 20 kHz (48 bands)

### Recommended computer specifications

CPU	Intel Core™2 Duo 2 GHz or higher
RAM	2 GB or more (4 GB recommended)
HDD	20 GB free or more (100 GB or more recommended)
DISPLAY	XGA (1 024 × 768) or more
OS	Microsoft Windows XP Professional 32 bit / 64 bit, 8 Pro 32 bit/64 bit



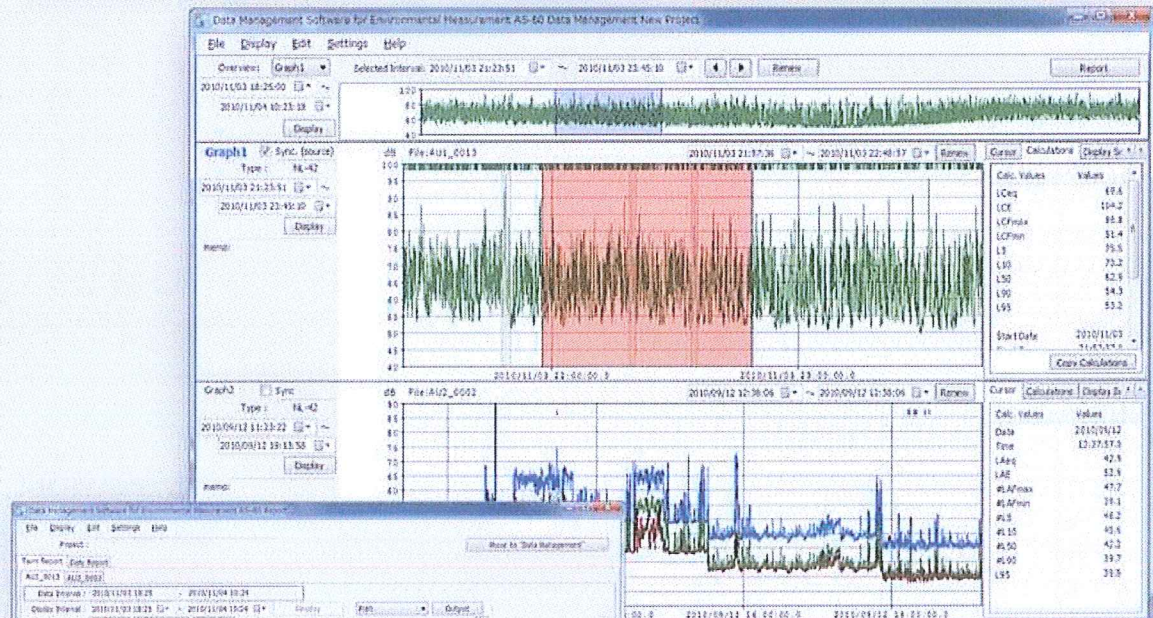
# Complete software for environmental measurements

## Data management software for environmental measurement AS-60

Free trial version  
now available on  
our website

Data management software for environmental measurement AS-60 enables the graph display of measurement data, arithmetic processing, excluded sound processing, preparation of reports, output of files, and playback of real sound files.

- Easy to use
- Reports easy to prepare
- Simultaneous display of multiple data items (up to 8 data items)
- Data stored in a data recorder can be loaded (CSV file for DA-40 Viewer)
- Data combination



Data management screen

### Supported models

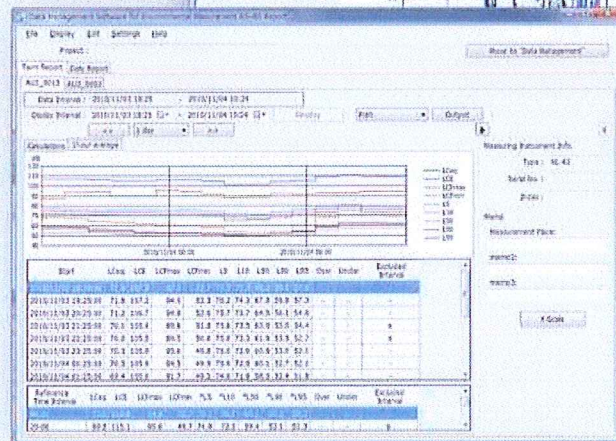
- NL-62\*
- NL-52/42\*
- NL-32/31/22/21\*
- DA-40Viewer

\*Only auto store data are supported.

### Recommended computer specifications (Common for AS-60/60RT/60VM)

- CPU Intel Core™2 Duo 2.0 GHz or higher
- RAM 2 GB or more
- DISPLAY XGA (1024 x 768) or more, at least 65 536 colors
- OS Microsoft Windows XP Professional 32 bit, 7 Professional 32 bit and 64 bit

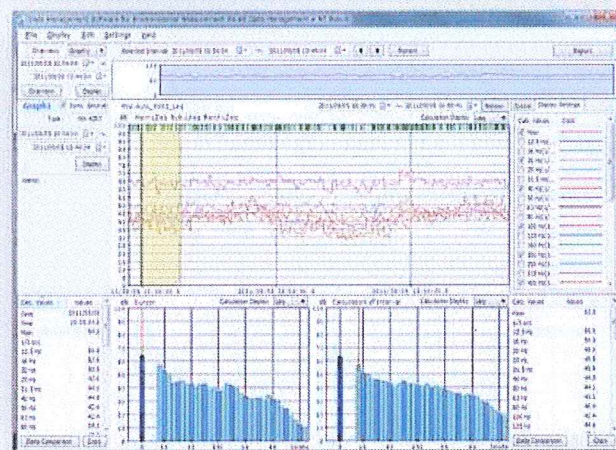
● If AS-60/60RT/60VM is used for NL-52/42 data, the NX-42EX is also needed.



Report preparation screen

## Data management software for environmental measurement AS-60RT

(Includes the octave and 1/3 octave data management software)



Data management screen

### Adds support for handling octave band analysis data to AS-60

AS-60RT is for managing NX-62RT/42RT or NA-28 data on a computer.

### Supported models

- NX-62RT\*
- NX-42RT\*
- NA-28\*

\*Only auto store data are supported.

## Data management software for environmental measurement AS-60VM

(Includes the vibration level data management software)

Adds support for handling data measured with VM-53A to AS-60

### Supported models

- VM-53A\*

\*Only auto store data are supported.



## Specifications

	NL-52	NL-42
Applicable standards	IEC 61672-1: 2002 Class 1 ANSI S1.4-1983 Type 1 ANSI S1.4A-1985 Type 1 ANSI S1.43-1997 Type 1 JIS C 1509-1: 2005 Class 1	IEC 61672-1: 2002 Class 2 ANSI S1.4-1983 Type 2 ANSI S1.4A-1985 Type 2 ANSI S1.43-1997 Type 2 JIS C 1509-1: 2005 Class 2
	CE Marking (EMC Directive 2004/108/EC, Low Voltage Directive 2006/95/EC), WEEE Directives, Chinese RoHS (export model for China only)	
Measurement functions	Simultaneous measurement of the following items, with selected time weighting and frequency weighting	
Processing (main ch)	Instantaneous sound pressure level: $L_p$ Equivalent continuous sound pressure level: $L_{eq}$ Sound exposure level: $L_E$ Maximum sound pressure level: $L_{max}$ Minimum sound pressure level: $L_{min}$ Percentile sound levels: $L_N$ (0.1 to 99.9 %, 0.1-increment steps, max. 5 values)	
Processing (sub ch)	Instantaneous sound pressure level: $L_p$	
Additional processing	In addition to main processing items, one of the following can be selected for simultaneous processing: C-weighted equivalent continuous sound level: $L_{Ceq}$ C-weighted peak sound level: $L_{Cpeak}$ Z-weighted peak sound level: $L_{Zpeak}$ 1-time-weighted equivalent continuous sound level: $L_{A1eq}^{*2}$ Maximum 1-time-weighted equivalent continuous sound level: $L_{A1max}^{*2}$ The power average of the maximum level of each 5 second interval: $L_{A1ms}$ The frequency weighting for the additional processing synchronizes with the frequency weighting of the sub-channel, so when the sub-channel has A-weighting, $L_{Nms}$ can be selected. When C-weighting (Z-weighting) is selected, the additional processing $L_{Ceq}$ and $L_{Cpeak}$ ( $L_{Zpeak}$ ) are selectable.	
Microphone	Type	UC-59
	Sensitivity level	-27 dB
Measurement range	A-weighting: 25 dB to 138 dB C-weighting: 33 dB to 138 dB Z-weighting: 38 dB to 138 dB C-weighting peak sound level: 55 dB to 141 dB Z-weighting peak sound level: 60 dB to 141 dB	UC-52
Inherent noise	A-weighting: 17 dB or less C-weighting: 25 dB or less Z-weighting: 30 dB or less	19 dB or less 27 dB or less 32 dB or less
Frequency range	20 Hz to 20 kHz	20 Hz to 8 kHz
Frequency weighting	A, C, and Z	
Time weighting	F (Fast) and S (Slow)	
Level range	Single range (Linearity range: 113 dB) Bar graph display range max: Max. 110 dB (20 to 130 dB) Switching of bar graph display: Set the upper/lower limit in 10 dB increments.	
RMS detection circuit	Digital processing method	
Sampling cycle	20.8 $\mu$ s ( $L_p$ , $L_{eq}$ , $L_E$ , $L_{max}$ , $L_{min}$ , $L_{peak}$ : sampling frequency: 48 kHz) 100 ms ( $L_N$ )	
Calibration	Electrical calibration performed according to IEC and JIS standards, using internally generated signals: acoustic calibration performed with the NC-74.	
Correction functions	Windscreen correction: Compliant with IEC 61672-1 and JIS C 1509-1 standards when the windscreen is installed. Diffuse sound field correction: Correction of frequency characteristics in order to comply with standards (ANSI S1.4) in diffuse sound field.	
Delay time	The meter can be set to start measuring a specified time (OFF, 1, 3, 5 or 10 s) after the start button has been pressed or when a user-set trigger is exceeded.	
Back erase function	When the PAUSE key is pressed to pause measurement, the preceding (user selectable) 0, 1, 3 or 5 s data are excluded from processing.	
Display	Backlit semitransparent color TFT LCD display WQVGA (400 x 240 dots) *LCD with touch panel (Capacitive Touch Panel) Numerical display update frequency: 1 s Bar graph update frequency: 100 ms	
Store	Manual	Data for measurement results are stored manually in single address increments.
	Number of data	Internal memory: max. 1,000 sets SD Card: depends on the capacity of the SD Card *1
	Auto *2	Instantaneous values ( $L_p$ mode) and processed values ( $L_{eq}$ mode) are stored continuously and automatically at preset intervals.
	$L_p$ sampling cycle	100 ms, 200 ms, 1 s, $L_{eq}$ 1s
	$L_{eq}$ sampling cycle	10 s, 1, 5, 10, 15, 30 min, 1, 8, 24 h, and user selected time (up to 24 hours)
	Measurement Time	Max. 1,000 h in Auto $L_p$ storage mode, max. 100,000 addresses in Auto $L_{eq}$ storage mode (depends on the capacity of the SD card) *1

Data recall	Allows viewing of stored data
Setup memory	Up to five setup configurations can be saved in internal memory, for later recall Start up via file settings previously stored on SD card possible
Waveform recording *3	
File format	Uncompressed waveform WAVE file
Sampling frequency	Select 48 kHz, 24 kHz or 12 kHz
Data length	Select 24 bit or 16 bit
Outputs	DC output
	Output voltage
	2.5 V, 25 mV / dB at bar graph display full scale
	AC output
	Output AC signals using a frequency weighting characteristic selected by processing or by A, C, Z-weighting.
	Output voltage
	1 V (rms values) at bar graph display full scale
	Comparator output *2
	Turns on when the open-collector output exceeds the set value (max. applied voltage 24 V, max. current 60 mA, allowable dissipation 300 mW).
USB	Allows USB to be connected to a computer and recognized as a removable disk Allows USB to be controlled via communication commands
RS-232C communication	Allows for RS-232C communication via use of a dedicated cable
Data continuous output *2	
Type of data	Instantaneous value
	Processed value
Output Interval	$L_p$ $L_{eq}$ , $L_{max}$ , $L_{min}$ , $L_{peak}$ 100 ms
Print out	Printing of measurement results on dedicated printer DPU-414
Power requirements	Four IEC R6 (size AA) batteries (alkaline or rechargeable batteries) or external power supply
Battery life (23 °C)	Alkaline battery LR6 (AA): 26 h Ni-MH secondary battery: 25 h At the maximum *Depends on the setting
AC adapter	NC-98C (NC-34 for previous models cannot be used)
External power voltage	5 to 7 V (rated voltage: 6 V)
Current consumption	Approximately 90 mA (normal operation, rated voltage)
Ambient conditions	Temperature
	-10 to +50 °C
	Humidity
	10 to 90 % RH (non-condensing)
Dustproof / water-resistant performance *4	IP code: IP54 (except for microphone) See precautions regarding waterproofing
Dimensions, weight	Approx. 250 (H) x 76 (W) x 33 mm (D), approx. 400 g (with batteries)
Supplied accessories	Storage case x 1, Windscreen WS-10 x 1, Windscreen fall prevention rubber x 1, Hand strap x 1, LR6 (AA) alkaline batteries x 4, SD card 512 MB x1 (NX-42EX preinstalled model only)

## Options

Product name	Product number
Extended function program (Inst.on 512 MB SD card)	NX-42EX
Waveform recording program *2 (Inst.on 2 GB SD card)	NX-42WR
Octave, 1/3 octave real-time analysis program *2 (Inst.on 512 MB SD card)	NX-42RT
Reverberation time measurement program *2 (Inst.on 512 MB SD card)	NX-42RV
FFT analysis program *2 (Inst.on 512 MB SD card)	NX-42FT
Data management software for environmental measurement	AS-60
Data management software for environmental measurement (Includes the octave and 1/3 octave data management software)	AS-60RT
Data management software for environmental measurement (Includes the vibration level data management software)	AS-60VM
Waveform analysis software	AS-70
SD Card 512 MB	MC-51SD1
SD Card 2 GB	MC-20SD2
AC adapter (100 V to 240 V)	NC-98C
Battery pack	BP-21A
Microphone extension cables	EC-04 (from 2 m)
BNC-Pin output code	CC-24
Comparator output cable	CC-42C
Printer	DPU-414
Printer cable	CC-42P
RS 232C serial I/O cable	CC-42R
USB cable	Generic USB cable can be used
Sound calibrator	NC-74
All-weather windscreen	WS-15
Windscreen mounting adapter	WS-15006
Rain-protection windscreen	WS-16
Sound level meter tripod	ST-80
All-weather windscreen tripod	ST-81

\*1 Use Rion fully guaranteed products. \*2 NX-42EX required (sold separately). \*3 NX-42WR required (sold separately). \*4 Protection against harmful dust and water splashing from any direction.

### Precautions regarding waterproofing

Before use, verify that the rubber bottom cover and the battery compartment lid are firmly closed.  
To maintain the water and dust proof rating, internal packing replacement is required every two years (at cost).

\* Windows is a trademark of Microsoft Corporation.  
\* Specifications subject to change without notice.

Distributed by:

 **RION CO., LTD.**  
http://svmeas.rion.co.jp/

3-20-41, Higashimotomachi, Kokubunji, Tokyo 185-8533, Japan  
Tel: +81-42-359-7888 Fax: +81-42-359-7442

This product is environment-friendly. It does not include toxic chemicals on our policy.  
This product is certified to an International Protection rating of IP54 (dust protected and resistant to splashing water).  
This leaflet is printed with environmentally friendly vegetable-based ink on recycled paper.



ISO 14001 RION CO., LTD.  
ISO 9001 RION CO., LTD.