JOB NO.: TCS01175/21

WSD Contract No.: 3/WSD/20 -

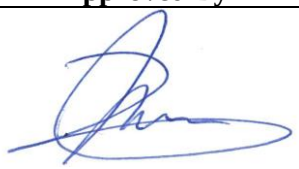
Reclaimed Water Supply to Sheung Shui and Fanling

BASELINE MONITORING REPORT

PREPARED FOR

WATER SUPPLIES DEPARTMENT

Quality Index

Date	Reference No.	Prepared By	Approved By
24 November 2021	TCS01216/21/600/R0017v3	 Martin Li Environmental Consultant	 TW Tam Environmental Team Leader

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1	19 November 2021	First Submission
2	22 November 2021	Amended against IEC comments dated on 22 November 2021
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Date: 24th November 2021

Project Manager
Water Supplies Department
Immigration Tower, 7 Gloucester Road,
Wan Chai, Hong Kong
Attn: Mr. Freeman Kei

Dear Sir,

Agreement No. CE67/2017(WS)
Reclaimed Water Supply to Sheung Shi and Fanling – Investigation, Design and Construction
Independent Environmental Checker (IEC) Services for
Shek Wu Hui Water Reclamation Plant under Contract No. 3/WSD/20

Baseline Monitoring Report

We refer to the Baseline Monitoring Report for WSD Contract No.: 3/WSD/20 – Reclaimed Water Supply to Sheung Shui and Fanling certified by the Environmental Team Leader on 24th November 2021. Please note we have no adverse comments on the captioned submission. The captioned submission is hereby verified in accordance with the requirement stipulated in Condition 3.2 of Environmental Permit No. FEP-01/470/2013.

Should you have any query, please feel free to contact the undersigned at 2877 3122 or at 6113 2368 (vegawong@nt.com.hk).

Yours Sincerely,
For and on behalf of
Nature & Technologies (HK) Limited

Vega Wong
Independent Environmental Checker

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EXECUTIVE SUMMARY

ES.01 Water Supplies Department (WSD) is the Project Proponent and the Permit Holder of **Reclaimed Water Supply to Sheung Shui and Fanling** (hereinafter referred as "the Contract Works"), which is a Designated Project to be implemented under Further Environmental Permit number FEP-01/470/2013 (hereinafter referred as "the FEP-01/470/2013" or "the FEP").

ES.02 Action-United Environmental Services & Consulting (hereinafter referred as "AUES") has been commissioned as the Environmental Team for the Contract Works (hereinafter referred as "the ET") to perform relevant EM&A programme, including baseline and impact environmental monitoring in accordance with the Updated EM&A Manual under the Environmental Impact Assessment Ordinance (EIAO).

ES.03 In according with the Updated EM&A Manual stipulation and the location of Contract Works, only construction noise monitoring and waterbird of ecological monitoring are required during the construction phase of the Contract Works. Moreover, baseline environmental monitoring is required to be conducted prior to commencement of the construction works under the Contract Works. Hence, baseline noise monitoring by the ET was conducted from ***4th*** to ***17th November 2021***. During the baseline noise monitoring period, no construction activities under the Project but other external influencing factors of significant concern were observed.

ES.04 Furthermore, baseline ecological monitoring for waterbirds along Ng Tung River, Sheung Yue River and Shek Sheung River was conducted by Drainage Services Department (DSD) from ***December 2017*** to ***June 2019***.

ES.05 This report summarizes the key findings and presents the process and rationale behind determining a set of Action and Limit Levels (A/L Levels) of construction noise and ecological based on the baseline data. These A/L Levels will serve as the yardsticks for assessing the acceptability of the environmental impact during construction phase of the Contract Works impact monitoring. They are statistical in nature and derived according to the criteria set out in the Updated EM&A Manual.

ES.06 Results of the derived Action and Limit Levels for the noise and ecological monitoring are given in ***Tables ES-1*** and ***ES-2*** as follows.

Table ES-1 Action and Limit Levels of Construction Noise Monitoring

Monitoring Location	Action Level	Limit Level in dB(A)
	Time Period: 0700-1900 hours on normal weekdays	
CP-KTN-NMS5	When one or more documented complaints are received	75 dB(A)[Note 1]

Note 1: If works are to be carried out during restricted hours, the conditions stipulated in the construction noise permit issued by the NCA have to be followed.

Table ES-2 Action and Limit Levels and Responses to Evidence of Disturbance to Waterbirds using Ng Tung, Sheung Yue and Shek Sheung Rivers during Construction Phase

Action Level	Responses	Limit Level	Responses
Decline in numbers of all waterbird species relative to numbers during Baseline Monitoring such that the Action Level response is triggered.	Investigate cause and if cause identified as related to the Project instigate remedial action to remove or reduce the source of disturbance.	Decline in numbers of all waterbird species relative to numbers during baseline monitoring such that the limit level response is triggered.	Investigate cause and if caused identified related to the Project instigate remedial action. Review and adjust project's management measures to improve conditions for affected species.

Action Level	Responses	Limit Level	Responses
Decline in numbers of any one waterbird species occurring in significant numbers* during Baseline Monitoring such that the Action Level response is triggered.	Investigate cause and if cause identified as related to the Project instigate remedial action to remove or reduce the source of disturbance.	Decline in numbers of any one waterbird species occurring in significant numbers* during Baseline Monitoring such that the Limit Level response is triggered.	Investigate cause and if caused identified related to the Project instigate remedial action. Review and adjust project's management measures to improve conditions for affected species.

Note: Whether numbers are significant depend on species and season after collection and evaluation of baseline survey data.

ES.6 In cases where exceedance of these criteria occurs, actions should be carried out in accordance with the Event Action Plan as shown the Updated EM&A Manual.

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1. INTRODUCTION

BACKGROUND

1.01 Water Supplies Department (WSD) is the Project Proponent of Utilization of Treated Sewage Effluent (TSE) from Shek Wu Hui Sewage Treatment Works. On 30th July 2021, China Geo-Engineering Corporation (hereinafter named as "the Main-Contractor") was awarded WSD Contract Works 3/WSD/20 - Reclaimed Water Supply to Sheung Shui and Fanling (hereinafter referred as "the Contract Works").

1.02 The major work of the Contract Works is to construct the Shek Wu Hui Water Reclamation Plant. Location of Shek Wu Hui Water Reclamation Plant is shown in ***Appendix A***. For the Contract Works, Shek Wu Hui Water Reclamation Plant construction is a Designated Project to be implemented under Further Environmental Permit number FEP-01/470/2013 (hereinafter referred as "the FEP-01/470/2013" or "the FEP").

1.03 Pursuant to the FEP stipulation, the Main Contractor has commissioned Action-United Environmental Services & Consulting (hereinafter referred as "AUES") as Environmental Team (hereinafter referred as "ET") perform relevant EM&A programme and as well as the associated duties.

1.04 In according with the approved Updated EM&A Manual of CEDD Contract No. NDO 14/2018 - *Advance and First Stage Works of Kwu Tung North and Fanling North New Development Areas* (hereinafter referred as "the Updated EM&A Manual") stipulation and the location of Project, only construction noise monitoring and waterbird of ecological monitoring are required during the construction phase of the Contract Works. Moreover, baseline environmental monitoring is required to be conducted prior to commencement of the construction works under the Project.

1.05 A 14 consecutive days baseline noise monitoring at the designated location CP-KTN-NMS5 was conducted by the ET from ***4th*** to ***17th November 2021***. During the baseline noise monitoring period, no construction activities under the Project but other external influencing factors of significant concern were observed.

1.06 Baseline waterbirds ecological monitoring has been undertaken by DSD and completed in ***June 2019*** in compliance with the Updated EM&A Manual.

1.07 This Baseline Monitoring Report presents the details of the baseline study including project background, monitoring methodology, monitoring results, summary of findings, and Action/Limit (A/L) Levels established for subsequent use in EM&A programme of the Contract Works construction phase.

REPORT STRUCTURE

1.08 The Baseline Monitoring Report is structured into the following sections:-

Section 1	Introduction
Section 2	Summaries of Baseline Monitoring Requirement.
Section 3	Baseline Monitoring Methodology
Section 4	Baseline Monitoring Results
Section 5	Conclusions and Recommendations

2. SUMMARIES OF BASELINE MONITORING REQUIREMENT UNDER THE CONTRACT WORKS

GENERAL

2.01 According to the Updated EM&A Manual and the location of the Contract Works, only construction noise monitoring and waterbirds ecological of environmental monitoring are related the Contract Works during the construction phase. Details requirement of noise and waterbirds ecological baseline monitoring are presented sub-sections as below.

REQUIREMENT OF BASELINE NOISE MONITORING

2.02 Baseline noise monitoring shall be carried out prior to the commencement of the construction works. There shall not be any construction activities under the Contract Works in the vicinity of the stations during the baseline monitoring.

2.03 Baseline noise monitoring for the A-weighted levels Leq, L10 and L90 shall be carried out daily for a period of at least two weeks. One set of $L_{eq\ (30min)}$ noise monitoring result with a sample period of 5 minutes or 30 minutes between 0700 and 1900. In exceptional cases, when insufficient baseline monitoring data or questionable results are obtained, the ET leader shall liaise with the Supervisor to agree on an appropriate set of data to be used as a baseline reference.

2.04 Noise measurements shall not be made in fog, rain, wind with a steady speed exceeding 5m/s or wind with gusts exceeding 10m/s. The wind speed shall be checked with a portable wind speed meter capable of measuring the wind speed in m/s.

LOCATION OF BASELINE MONITORING

2.05 According to the Updated EM&A Manual of CEDD Contract No. NDO 14/2018 - *Advance and First Stage Works of Kwu Tung North and Fanling North New Development Areas*, four noise sensitive receivers are designated on Fanling North New Development Areas for construction noise monitoring.

2.06 According to the geographic location of proposed Shek Wu Hui Water Reclamation Plant and all the recommended designated construction noise monitoring stations, only the designated noise monitoring station CP-KTN-NMS5 (prior named "CP-NMS7") shown in ***Appendix B***, is located nearby the proposed Shek Wu Hui Water Reclamation Plant within 300m (distance about 110m).

2.07 Therefore, the designated noise monitoring station CP-KTN-NMS5 is recommended for the Contract Works to undertake construction noise monitoring. If the designated noise monitoring location CP-KTN-NMS5 not available, the ET shall propose alternative monitoring locations/additional monitoring locations and seek approval from the Supervisor of the proposal. When alternative/new monitoring locations are proposed, the monitoring locations shall be chosen based on the following criteria:

(i) at locations close to the major site activities which are likely to have noise impacts;

(ii) close to the noise sensitive receivers; and

(iii) for monitoring locations located in the vicinity of the sensitive receivers, care shall be taken to cause minimal disturbance to the occupants during monitoring.

2.08 The construction noise monitoring station shall normally be at a point 1 m from the exterior of the sensitive receivers building façade and be a position 1.2m above the ground. If there is problem with access to the normal monitoring position, an alternative position may be chosen, and a correction to the measurements shall be made to the free field measurements. The ET shall agree with the Supervisor on the monitoring stations that are chosen, the baseline monitoring and the impact monitoring shall be carried out at the same positions.

EVENT AND ACTION PLAN

2.09 The Action and Limit levels for construction noise are defined in **Table 2.1**. Should non-compliance of the criteria occur, action in accordance with the Action Plan which shown in Section 4 of this report**,** shall be carried out.

Table 2.1 Action and Limit Levels for Construction Noise

Time Period(1)	Action Level	Limit Level
0700 – 1900 hours on normal weekdays	When one documented complaint is received	75 dB(A)(2)

Notes:
(1) If works are to be carried out during restricted hours, the conditions stipulated in the Construction Noise Permit (CNP) issued by the Noise Control Authority have to be followed.
(2) 70 dB(A) and 65 dB(A) for schools during normal teaching periods and school examination periods, respectively.

REQUIREMENT OF BASELINE WATERBIRDS ECOLOGICAL MONITORING

2.10 Where development under the NDAs project is undertaken within 200m (the maximum distance at which it is predicted there may be some disturbance, and hence a reduction in numbers, of large waterbirds) of the Ng Tung, Sheung Yue and Shek Sheung Rivers and Long Valley the monitoring protocol detailed in the updated EM&A Manual Table 12.1 should be followed. A transect should be undertaken throughout the sections of the rivers where NDA construction activities are proposed; as the sensitive receivers (large waterbirds) are easily visible, the transect route needs only follow one bank of the rivers. The transect route should remain the same during the different phases in order to ensure that data are comparable. Monitoring of large waterbirds should be conducted in pre-construction, construction and operational phases of the concerned development.

2.11 The proposed Shek Wu Hui Water Reclamation Plant location is located less than 200m to Ng Tung River, Sheung Yue River and Shek Sheung River, waterbirds ecological monitoring included pre-construction (i.e. baseline), construction (i.e. impact) and post-construction (i.e. operating) should be requires. The detailed monitoring protocol is listed in ***Table 2.2***.

Table 2.2 Monitoring of Measures to Minimize Disturbance to Waterbirds on the Ng Tung, Sheung Yue and Shek Sheung Rivers

Phase	Methodology
Pre-construction (baseline)	Weekly transect at both high and low tides to identify and enumerate all bird species utilising the river channels for 12 months prior to the commencement of construction.
Construction	Weekly transect at both high and low tides to identify and enumerate all bird species utilising the river channels and identify any sources of actual or potential disturbance to birds due to construction activities throughout the construction period.
Post-construction	Weekly transect at both high and low tides to identify and enumerate all bird species utilising the river channels and identify any sources of actual or potential disturbance to birds due to operational activities for 12 months following the completion of the construction period.

2.12 Waterbirds ecological baseline monitoring at Ng Tung River, Sheung Yue River and Shek Sheung River was conducted by DSD between ***December 2017*** and ***June 2019*** (total 19 months baseline monitoring)**,** in compliance with the Updated EM&A Manual. Thus, the action and limit levels and responses to evidence of disturbance to waterbirds using in Ng Tung, Sheung Yue and Shek Sheung Rivers can be made reference to the baseline monitoring conducted by DSD.

2.13 Measures to respond to decrease in numbers of large waterbirds using the river channels and action and limit levels to trigger these measures are detailed in ***Table 2.3***.

Table 2.3 Action and Limit Levels for Ecological (Waterbirds)

Action Level	Limit Level
Construction Phase	
Decline in numbers of all waterbird species relative to numbers during Baseline Monitoring such that the Action Level response is triggered.	Decline in numbers of all waterbird species relative to numbers during Baseline Monitoring such that the Limit Level response is triggered.
Decline in numbers of any one waterbird species occurring in significant numbers*	Decline in numbers of any one waterbird species occurring in significant numbers*

Action Level	Limit Level
during Baseline Monitoring such that the Action Level response is triggered.	during Baseline Monitoring such that the Limit Level response is triggered.
Operational Phase	
Decline in numbers of all waterbird species relative to numbers during Baseline Monitoring such that the Action Level response is triggered.	Decline in numbers of all waterbird species relative to numbers during Baseline Monitoring such that the Limit Level response is triggered.
Decline in numbers of any one waterbird species occurring in significant numbers* during Baseline Monitoring such that the Action Level response is triggered.	Decline in numbers of any one waterbird species occurring in Significant numbers* during Baseline Monitoring such that the Limit Level response is triggered.

Note that waterbird numbers refer to combined numbers using the channels

3. BASELINE NOISE MONITORING METHODOLOGY

LOCATION OF BASELINE MONITORING

3.01 Prior baseline noise monitoring, a site visit was conducted by Environmental Team to identify the designated monitoring location CP-KTN-NMS5. After the designated location identified, baseline noise monitoring was conducted from ***4th to 17th November 2021*** at the designated noise monitoring station CP-KTN-NMS5. During the baseline monitoring period, no construction activities were carried out at the work areas under the Contract Works. CP-KTN-NMS5 of the address and location are respectively described in ***Table 3.1*** and shown in ***Appendix B***. Moreover, the monitoring schedule was in ***Appendix C.***

Table 3.1 Baseline Noise Monitoring Location

Noise Monitoring Location ID	Address and description
CP-KTN-NMS5	Scattered Village Houses near Fu Tei Au Road

FREQUENCY AND PERIOD

3.02 The details of frequency and duration of the baseline noise monitoring was shown below.

- Frequency: 1 set of $Leq_{(30min)}$ measurement during daytime period between 07:00 and 19:00; moreover, statistical results such as L_{10} and L_{90} to record
- Duration: 14 consecutive days (included two Sunday or public holidays) prior to the commencement of construction work

MONITORING EQUIPMENT

3.03 Sound level meter in compliance with the International Electrotechnical Commission Publications 651: 1979 (Type 1) and 804: 1985 (Type 1) specifications was used for carrying out the noise monitoring. Noise equipment used for baseline monitoring is listed in ***Table 3.2,*** and the specification and the valid calibration certificates of the monitoring equipment are shown in ***Appendix D*** *and* ***Appendix E*** respectively.

Table 3.2 Baseline Noise Monitoring Equipment

Equipment	Model
Integrating Sound Level Meter	Rion NL – 52 / B&K 2238
Calibrator	Rion NC – 74 / B&K 4231

Remark: Sound level meter IEC 60651:1979 (Type 1) was replaced by 60672 (Type 1) in 2002
Ref: https://webstore.iec.ch/publication/17086

MONITORING PROCEDURE

3.04 All noise measurements were performed with the meter set to FAST response and on the A-weighted equivalent continuous sound pressure level (Leq). $Leq_{(30min)}$ in six consecutive $Leq_{(5min)}$ measurements was used as the monitoring parameter for the time period between 07:00-19:00 hours during the baseline monitoring.

3.05 In general, the sound level meter would be mounted on a tripod at a height of 1.2 m and placed at the assessment point and oriented such that the microphone was pointed to the site with the microphone facing perpendicular to the line of sight. The windshield would be fitted for all measurement. Where a measurement was to be carried out at a building, the assessment point would normally be at a position 1 m from the exterior of the building façade. Where a measurement was to be made for noise being received at a place other than a building, the assessment point would be at a position 1.2 m above the ground in a free-field situation, i.e. at least 3.5 m away from reflective surfaces such as adjacent buildings or walls.

3.06 Immediately prior to and following each noise measurement the accuracy of the sound level meter was checked using an acoustic calibrator generating a known sound pressure level at a known frequency. Measurements would be accepted as valid only if the calibration level from before and after the noise measurement agrees to within 1.0 dB.

3.07 Noise measurements would not be made in fog, rain, wind with a steady speed exceeding 5m/s or wind with gusts exceeding 10m/s. The wind speed would be checked with a portable wind speed

meter capable of measuring the wind speed in m/s.

DATA MANAGEMENT AND DATA QA/QC CONTROL

3.08 The baseline monitoring data were handled by the ET's in-house data recording and management system.

3.09 The monitoring data recorded in the equipment were downloaded directly from the equipment at each monitoring day or after completion of baseline measurement. The downloaded monitoring data were input into a computerized database properly maintained by the ET.

4. BASELINE MONITORING RESULTS

BASELINE NOISE MONITORING

4.01 The baseline noise monitoring schedule is presented in ***Appendix C*** and the monitoring results are presented in the following sections.

RESULTS OF NOISE MONITORING

4.02 The baseline noise monitoring was undertaken from ***4th to 17th November 2021*** at the proposed designated monitoring location CP-KTN-NMS5 and the measurement was carried out in free-field situation. Detailed baseline noise monitoring data are shown in ***Appendix F*** and the results are summarized in ***Table 4.1***.

Table 4.1 Summaries of Noise Monitoring Results of CP-KTN-NMS5

Time Period	dB(A)		
	Mean (note)	Max (note)	Min (note)
Weekday Daytime 0700-1900 – $L_{eq\ (30mins)}$	54.7	58.9	52.5
Holiday Daytime 0700-1900 – $L_{eq\ (30mins)}$	55.1	57.8	52.4
Note: façade correction +3dB has added according to acoustical principles and EPD guidelines			

4.03 During the baseline noise monitoring periods, no rain was encountered and wind speed is below 5m/s and gusts not exceeding 10m/s. Furthermore, background noise of CP-KTN-NMS5 was dominated from residents and light vehicles from the path respectively or the others external construction works.

4.04 The Action and Limit levels for noise monitoring during construction period is proposed in ***Table 4.2***.

Table 4.2 Proposed Action and Limit Levels for Construction Noise

Noise Monitoring Location	Time Period(1)	Action Level	Limit Level
CP-KTN-NMS5	0700 – 1900 hours on normal weekdays	When one documented complaint is received	75 dB(A)

Notes:
(1) If works are to be carried out during restricted hours, the conditions stipulated in the Construction Noise Permit (CNP) issued by the Noise Control Authority have to be followed.

BASELINE ECOLOGICAL MONITORING FOR WATERBIRDS

4.05 Since baseline ecological monitoring for waterbirds at Ng Tung River, Sheung Yue River and Shek Sheung River has been undertaken by Drainage Services Department (DSD)**,** it is not required to carry out baseline monitoring under the Contract. Summary of baseline ecological monitoring for waterbirds findings extracted from DSD Contract "*SPW 08/2019 - Shek Wu Hui Effluent Polishing Plant - Main Works Stage 1*" is described as below.

4.06 Information extracted from Baseline Monitoring Report (Ecology) of DSD, baseline ecological monitoring for waterbirds was undertaken once per week at Ng Tung River, Shek Sheung River and Sheung Yue River from ***December 2017*** to ***June 2019***. The survey was performed during both lowest and highest tides along three transects and seven-point count locations, with a duration of 5 minutes in each point count location. According to waterbirds survey results, 4,147 individuals of waterbirds species were obesrved and 22 species of waterbirds were observed during the 19-month baseline monitoring. ***Table 4.3*** is summarized the survey results in the baseline monitoring periods.

Table 4.3 Summary for Waterbirds recorded by DSD in the 19-month Baseline Monitoring

Season	Winter	Summer	Overall
No. of Survey Months	10	9	19
Total Abundance	1,723	2424	4147
Species Richness	22	19	22

Season	Winter	Summer	Overall
Most Common Species (Overall Abundance)	Little Egret *Egretta garzetta* (571)	Little Egret *Egretta garzetta* (780)	Little Egret *Egretta garzetta* (1351)

4.07 ***Table 4.4*** is the recommended Action and Limit (A/L) Levels of waterbirds disturbance during construction phase for Ng Tung River, Shek Sheung River and Sheung Yue River.

Table 4.4 Action and Limit Levels of Waterbirds Disturbance using Ng Tung, Sheung Yue and Shek Sheung Rivers during Construction Phase

Location	Action Level	Limit Level
Ng Tung River, Sheung Yue River, and Shek Sheung River	Decline in numbers of all waterbird species relative to numbers during Baseline Monitoring such that the Action Level response is triggered.	Decline in numbers of all waterbird species relative to numbers during baseline monitoring such that the limit level response is triggered.
Ng Tung River, Sheung Yue River, and Shek Sheung River	Decline in numbers of any one waterbird species occurring in significant numbers* during Baseline Monitoring such that the Action Level response is triggered.	Decline in numbers of any one waterbird species occurring in significant numbers* during Baseline Monitoring such that the Limit Level response is triggered.

Reference:
https://files.cinotech.com.hk/download/MA19019/website/document/MA19019_BMR(Eco)_v1.0_signed.pdf
Note: Whether numbers are significant depend on species and season after collection and evaluation of baseline survey data.

4.08 The A/L Levels set up in ***Table 4.4*** are based on decline in two waterbird groups: (1) all waterbirds and (2) any one waterbird species occurring in significant numbers. A one-tailed Student t-test of statistical analysis will be used to comparing the waterbird-related data collected in baseline and construction phase monitoring. If the collected data for the reporting month fails to show no significant difference from that in the baseline phase at 95% confidence level, the action level will be triggered. Likewise, the limit level is set at 99% confidence level.

EVENT ACTION PLAN

4.09 Should any exceedance event during construction phase encountered, action and follow-up shall to require.

Noise

4.10 Should non-compliance of the construction noise criteria occur, action in accordance with the Action Plan in **Table 4.5** shall be carried out.

Table 4.5 Event and Action Plan for Construction Noise

Event	Action			
	ET	**IEC**	**ER**	**Contractor**
Action Level Exceedance	1. Notify the IEC, ER and Contractor; 2. Carry out investigation; 3. Report the results of investigation to the IEC, ER and Contractor; 4. Discuss with the Contractor and formulate remedial measures; 5. Increase monitoring frequency to check mitigation effectiveness.	1. Review the monitoring data submitted by the ET; 2. Review the construction methods and proposed remedial measures by the Contractor, and advise the ET and ER if the proposed remedial measures would be sufficient; 3. Supervise the implementation of remedial measures.	1. Confirm receipt of notification of failure in writing; 2. Notify the Contractor; 3. Require the Contractor to propose remedial measures for the analyzed noise problem; 4. Ensure remedial measures are properly implemented.	1. Submit noise mitigation proposals to the ER and IEC and copy to the ET; 2. Implement noise mitigation proposals.
Limit Level Exceedance	1. Identify sources. 2. Inform IEC, ER, EPD and Contractor; 3. Repeat measurements to confirm findings; 4. Increase the monitoring frequency; 5. Carry out analysis of the Contractor's working procedures with the ER and Contractor to determine possible mitigations to be implemented; 6. Inform IEC, ER, EPD and Contractor the causes and actions taken for the exceedances; 7. Assess the effectiveness of the Contractor's remedial action with the ER and keep the IEC informed of the results; 8. If exceedance stops, cease additional monitoring.	1. Discuss amongst the ER, ET and Contractor on the potential remedial actions; 2. Review the Contractor's remedial action whenever necessary to assure their effectiveness and advise the ER accordingly; 3. Supervise the implementation of remedial measures.	1. Confirm receipt of notification of exceedance in writing; 2. Notify the Contractor. 3. Require the Contractor to propose remedial measures for the analyzed noise problems; 4. Ensure remedial measures are properly implemented; 5. If exceedance continues, consider what portion of work is responsible and instruct the Contractor to stop that portion of works until the exceedance is abated.	6. Take immediate action to avoid further exceedance; 7. Submit proposals for remedial action to the ER and IEC and copy to the ET within 3 working days of notification; 8. Implement the agreed proposals; 9. Resubmit proposals if problems still not under control; stop the relevant portion of works as determined by the ER until the exceedance is abated.

Waterbird of Ecological

4.11 Should any exceedance encountered during construction phase, event action listed in ***Tables 4.6*** shall be required to carry out.

Table 4.6 Event and Action Plan of Waterbirds of Ecological

Exceedance	Responses
Action Level	• Investigate cause and if cause identified as related to the Project, instigate remedial action to remove or reduce the source of disturbance.
Limit Level	• Investigate cause and if caused identified related to the Project, instigate remedial action. • Review and adjust project's management measures to improve conditions for affected species.

5. CONCLUSIONS AND RECOMMENDATIONS

CONCLUSIONS

5.01 The baseline noise monitoring under the Contract Works was undertaken from ***4th*** to ***17th November 2021*** at the proposal designated monitoring location CP-KTN-NMS5. During the baseline monitoring period, no construction activities were carried out at the work areas under the Contract Works.

5.02 Based on the baseline monitoring results, the recommended environmental performance criteria of construction noise shall be as follows:

Recommended Action & Limit Levels for Noise during Construction Phase		
Monitoring Location	**Action Level**	**Limit Level in dB(A)**
	Time Period: 0700-1900 hours on normal weekdays	
CP-KTN-NMS5	When one or more documented complaints are received	75
Note: If works are to be carried out during restricted hours, the conditions stipulated in the construction noise permit issued by the NCA have to be followed.		

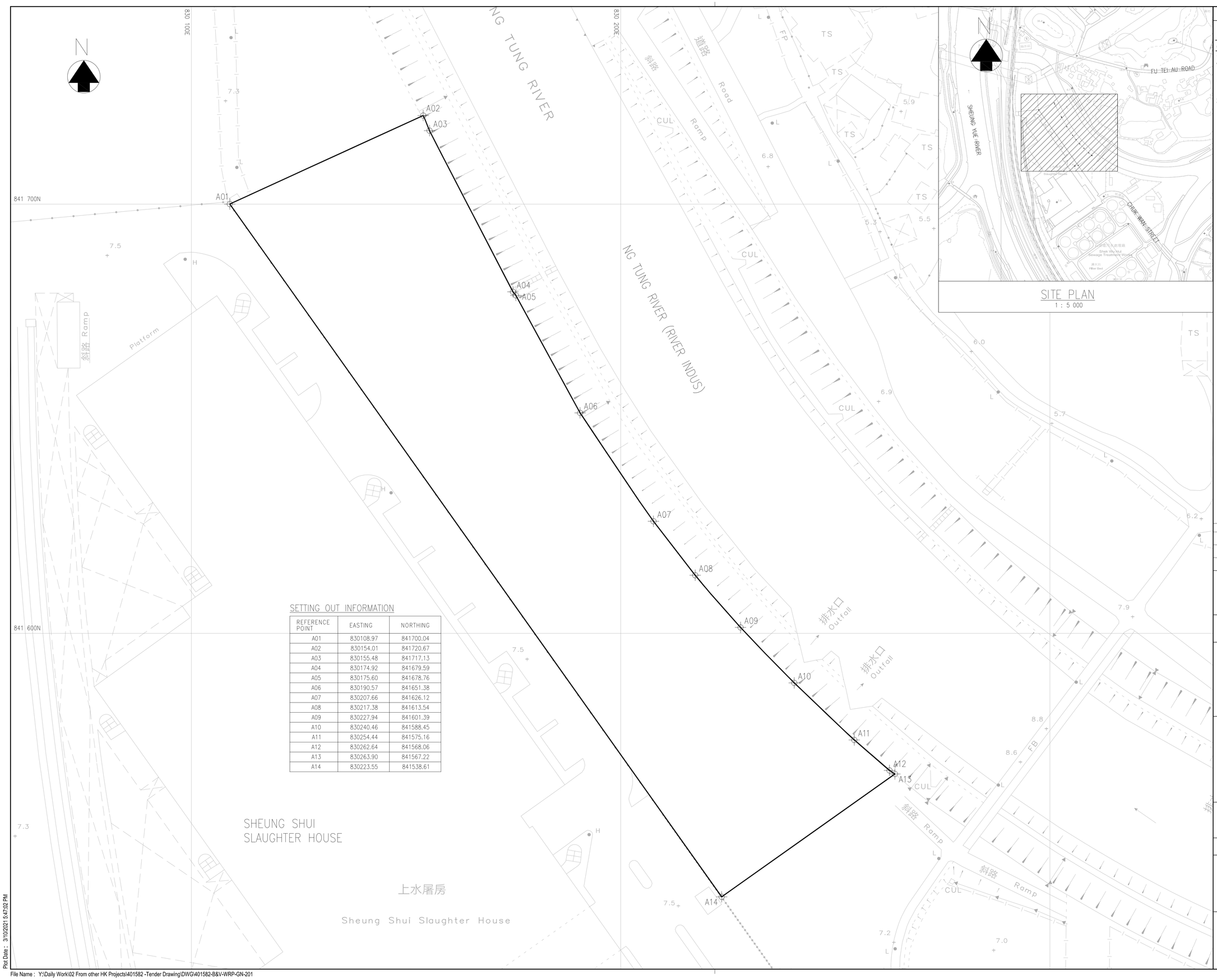
RECOMMENDATIONS

5.03 As extracted from Baseline Monitoring Report (Ecology) of DSD Works Contract "*SPW 08/2019 - Shek Wu Hui Effluent Polishing Plant - Main Works Stage 1*", the recommended Action and Limit (A/L) Levels of waterbirds disturbance setting-up for Ng Tung River, Shek Sheung River and Sheung Yue River during construction phase of the Contract Works shall be as follows:

Recommended Action and Limit Levels of Waterbirds Disturbance using Ng Tung, Sheung Yue and Shek Sheung Rivers during Construction Phase	
Action Level	**Limit Level**
Decline in numbers of all waterbird species relative to numbers during Baseline Monitoring such that the Action Level response is triggered.	Decline in numbers of all waterbird species relative to numbers during baseline monitoring such that the limit level response is triggered.
Decline in numbers of any one waterbird species occurring in significant numbers* during Baseline Monitoring such that the Action Level response is triggered.	Decline in numbers of any one waterbird species occurring in significant numbers* during Baseline Monitoring such that the Limit Level response is triggered.
Note: Whether numbers are significant depend on species and season after collection and evaluation of baseline survey data.	

Appendix A

Location of Shek Wu Hui Water Reclamation Plant



SITE PLAN
1 : 5 000

SETTING OUT INFORMATION

REFERENCE POINT	EASTING	NORTHING
A01	830108.97	841700.04
A02	830154.01	841720.67
A03	830155.48	841717.13
A04	830174.92	841679.59
A05	830175.60	841678.76
A06	830190.57	841651.38
A07	830207.66	841626.12
A08	830217.38	841613.54
A09	830227.94	841601.39
A10	830240.46	841588.45
A11	830254.44	841575.16
A12	830262.64	841568.06
A13	830263.90	841567.22
A14	830223.55	841538.61

NOTES:

1. ALL DIMENSIONS ARE IN MILLIMETRES UNLESS OTHERWISE SPECIFIED.
2. THE BASE PLAN IS EXTRACTED FROM SURVEY SHEET NOS. 2-SE AND 3-SW.

Revision	Date	Description			Initial
	Designed	Checked	Drawn	Checked	
Initial	CWC	WH	SZ	GC	
Date	02/21	02/21	02/21	02/21	

Approved

Contract No.
3/WSD/20

Contract Title
RECLAIMED WATER SUPPLY TO SHEUNG SHUI AND FANLING

Drawing Title
SWHWRP
(PART 1 OF THE SITE) –
SETTING OUT PLAN

Drawing No.	Revision
401582/B&V/WRP/GN/201	–

Scale: A1 1 : 400, A3 1 : 800

水 務 署
Water Supplies Department

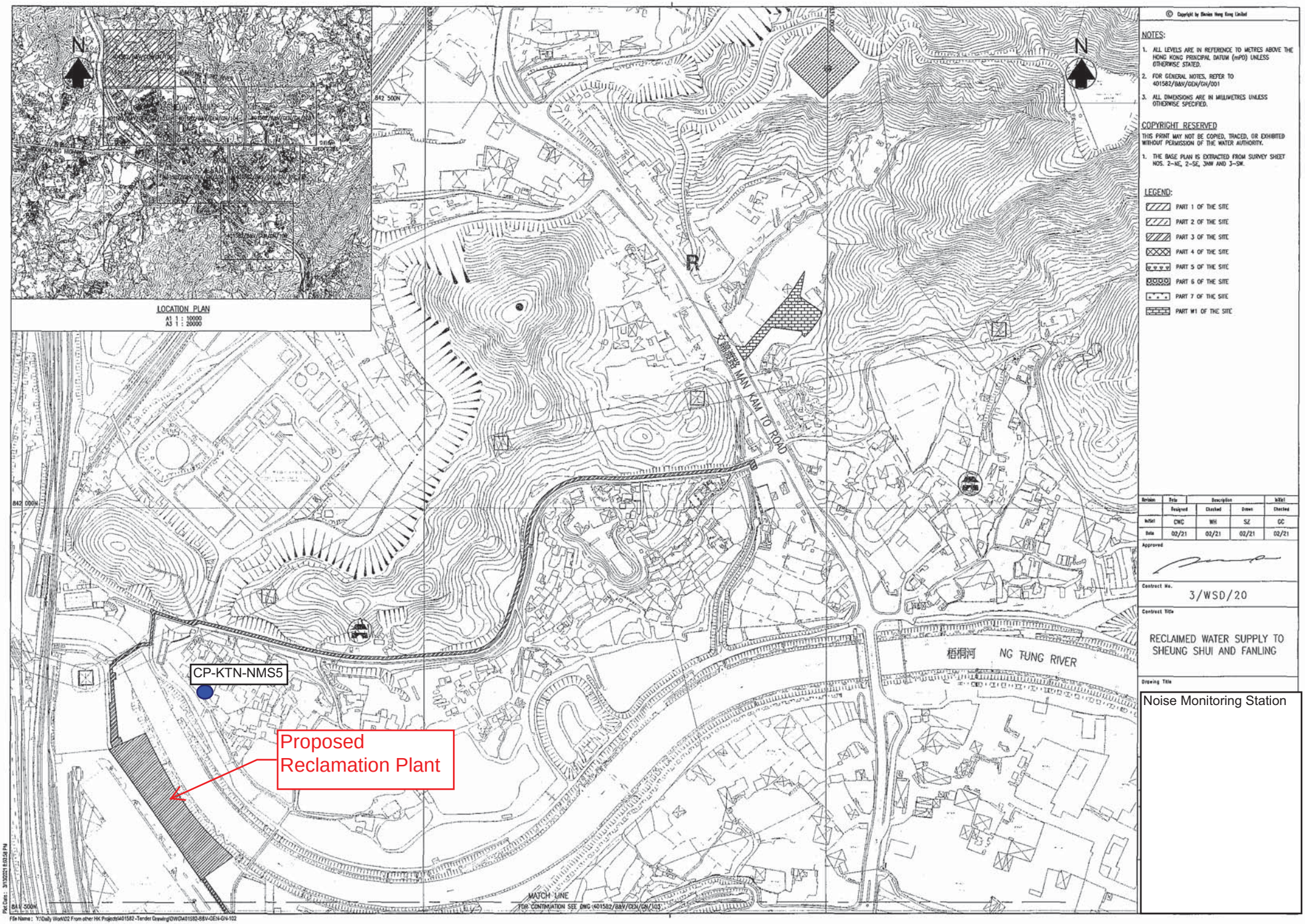
BINNIES HONG KONG LIMITED
賓尼斯工程顧問有限公司

Plot Date : 3/10/2021 5:47:02 PM

File Name : Y:\Daily Work\02 From other HK Projects\401582 -Tender Drawing\DWG\401582-B&V-WRP-GN-201

Appendix B

Location of Noise Monitoring Station CP-KTN-NMS5



NOTES:

1. ALL LEVELS ARE IN REFERENCE TO METRES ABOVE THE HONG KONG PRINCIPAL DATUM (mPD) UNLESS OTHERWISE STATED.
2. FOR GENERAL NOTES, REFER TO 401582/B&V/GEN/GN/001
3. ALL DIMENSIONS ARE IN MILLIMETRES UNLESS OTHERWISE SPECIFIED.

1. THE BASE PLAN IS EXTRACTED FROM SURVEY SHEET NOS. 2-NC, 2-SE, JNW AND J-SW.

LEGEND:

- PART 1 OF THE SITE
- PART 2 OF THE SITE
- PART 3 OF THE SITE
- PART 4 OF THE SITE
- PART 5 OF THE SITE
- PART 6 OF THE SITE
- PART 7 OF THE SITE
- PART W1 OF THE SITE

Revision	Date	Description			Initial
	Designed	Checked	Drawn		Checked
Initial	CWC	WH	SZ		CC
Date	02/21	02/21	02/21		02/21

Approved

Contract No.
3/WSD/20

Contract Title
RECLAIMED WATER SUPPLY TO SHEUNG SHUI AND FANLING

Drawing Title
Noise Monitoring Station

Plot Date: 3/3/2021 8:03:58 PM
File Name: T:\Daily Work\22 From other HK Projects\401582 -Tender Drawing\DWG\401582-B&V-GEN-GN-102

Appendix C

Baseline Noise Monitoring Schedule

Baseline Noise Monitoring Schedule

Date		Noise Monitoring
Thu	4-Nov-21	✓
Fri	5-Nov-21	✓
Sat	6-Nov-21	✓
Sun	7-Nov-21	✓
Mon	8-Nov-21	✓
Tue	9-Nov-21	✓
Wed	10-Nov-21	✓
Thu	11-Nov-21	✓
Fri	12-Nov-21	✓
Sat	13-Nov-21	✓
Sun	14-Nov-21	✓
Mon	15-Nov-21	✓
Tue	16-Nov-21	✓
Wed	17-Nov-21	✓

✓	Monitoring Day
	Sunday or Public Holiday

Noise Monitoring Location

Environmental Aspect	Monitoring Location	Location
Construction Noise	CP-KTN-NMS5	Scattered Village Houses near Fu Tei Au Road

Appendix D

Specification of Monitoring Equipment

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

RION

Measure Sounds Reliably

Sound Level Meter Class1 *NL-52*

Sound Level Meter Class2 *NL-42*

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 instructions 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

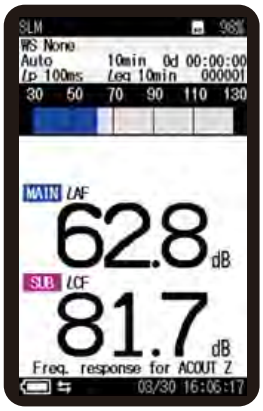
Three-inch LCD screen with a touch panel
High resolution screen is easy to see indoors or outdoors and even in the dark.

Variety of I/O Connections

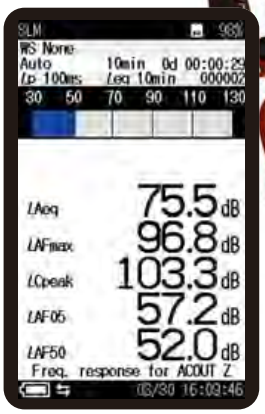
No paper manual is needed.

The manual and a help function
can be easily accessed on the device.

Measurement Display
(T-L graph)



Measurement Display
(Main and Sub Simultaneous Displays)



Parameter Screen

Manu 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 outdoor windscreen and rainproof windscreen helps raise the water-resistant performance of the entire unit, so that the microphone will also 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 dry alkaline batteries).**

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

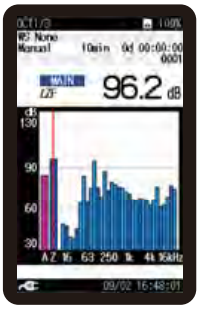
NL-52/42 1000 h (approx. one month)

Previous model 200 h (approx. one week)

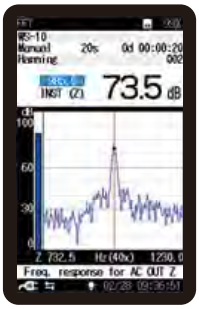
Example of detailed recording	If the L_P is measured at 100 ms intervals and the L_{eq} is simultaneously measured at 10 m intervals over a 24 h period, the total size of accumulated data is approximately 74 MB (reference value)

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 and long-term data recording.



1/3 octave band analysis screen



Analysis screen (x40)

Data management screen using AS-60 software

Optional program function list

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

Extended function program NX-42EX

Adds a number of programs.

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

NX-42EX →
+
NX-42WR →
NX-42RT →
NX-42FT →

＊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

+

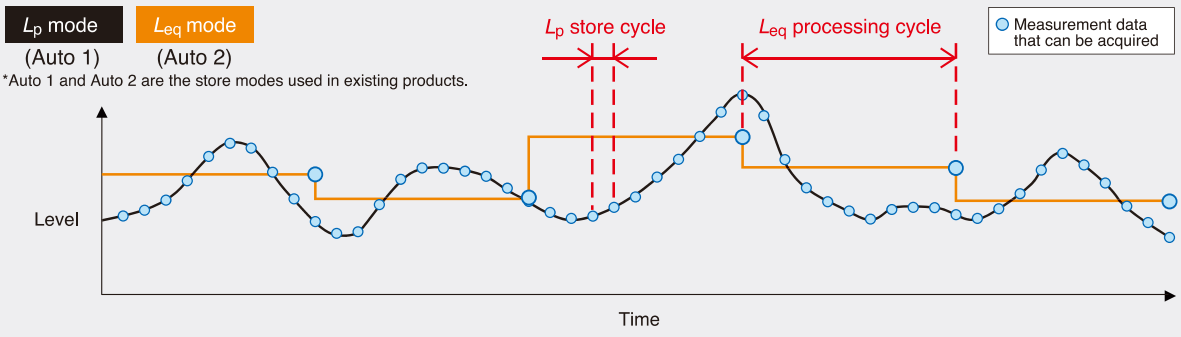
Program type / Additional function	NX-42WR	NX-42RT	NX-42FT
Real sound monitor (waveform recording)	●		
Octave, 1/3 octave band analysis		●	
Octave, 1/3 octave band filter output		●	
FFT analysis			●

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 1 000 h	Equipped with a timer function

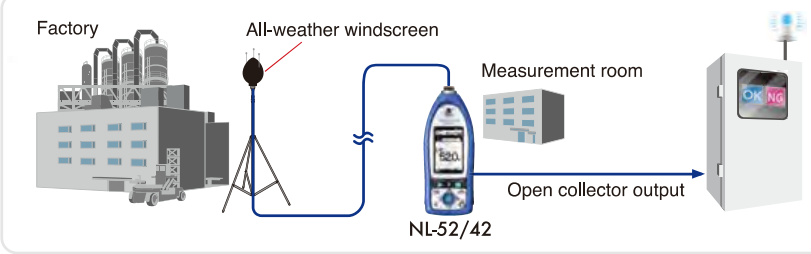
L_p mode (instantaneous SPL) and L_{eq} mode (equivalent continuous SPL) concept



Simultaneous recording in both L_p mode (Auto 1) and L_{eq} mode (Auto 2)

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, such as a program to be used as an indicator.

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 processing sound to process sound levels simultaneously. Recorded data can be played on computer and used for frequency analysis.

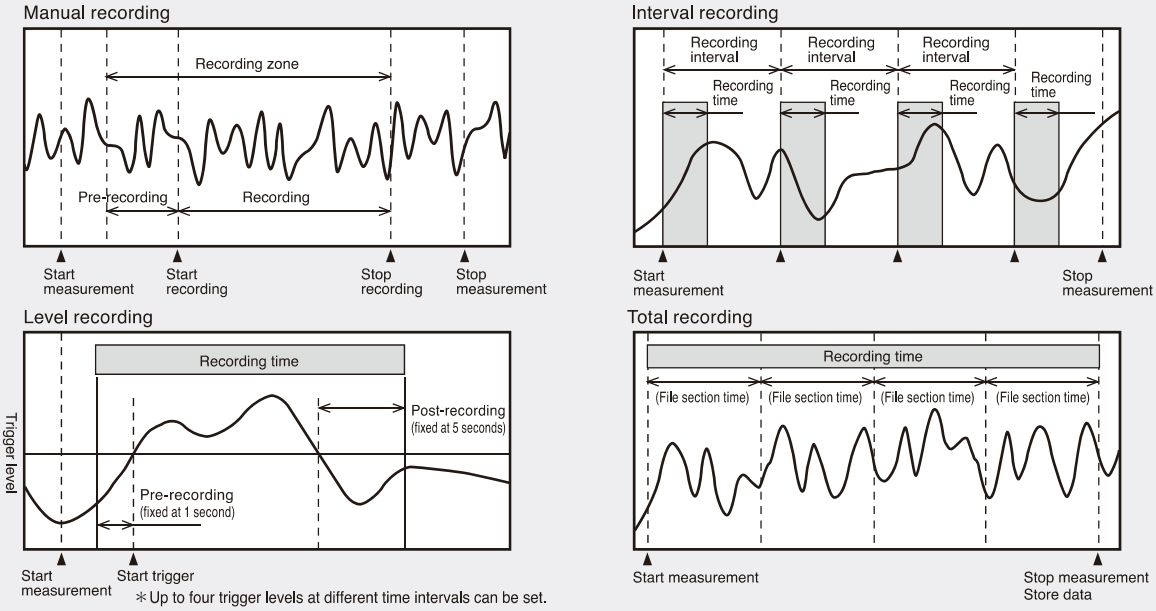
(Uncompressed waveform WAVE file)

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

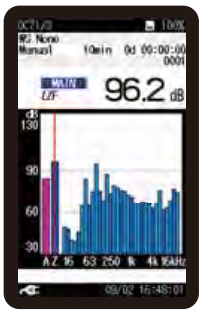
Recording concept



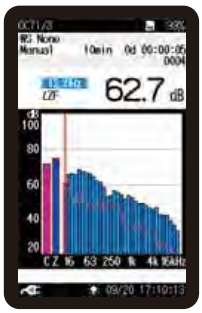
Octave, 1/3 octave real-time analysis program NX-42RT

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.

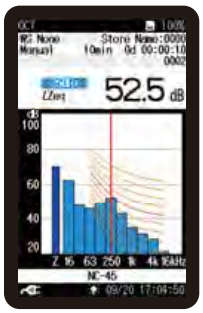
By adding a program to the NL-52/NL-42, octave band and 1/3 octave band analysis can be performed. Saved analysis results can be loaded and shown in an overlay graph display together with current analysis data. NC curve graph display and NC value calculation/display are also possible. Using the AS-60RT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



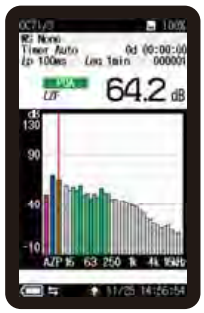
1/3 octave band analysis screen



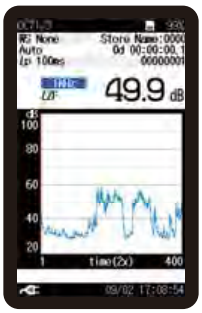
Overlay analysis screen



NC curve screen



Partial over all screen

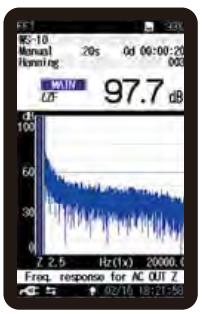


Measurement screen (T-L graph)

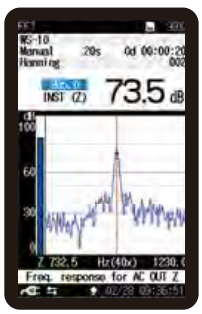
FFT analysis program NX-42FT

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.

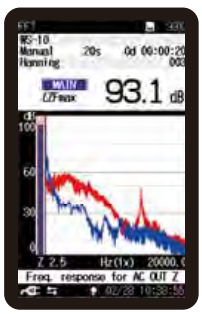
By adding a program to the NL-52/NL-42, FFT analysis can be performed. The analysis frequency range is 20 kHz, with 8 000 spectrum lines (200 displayed). Saved analysis results can be loaded and shown in an overlay graph display together with current analysis data. Maximum zoom ratio is x40, and the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



Analysis screen (x1)

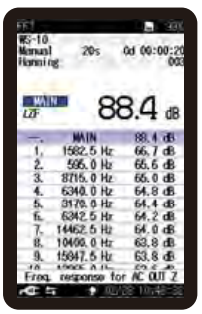


Analysis screen (x40)



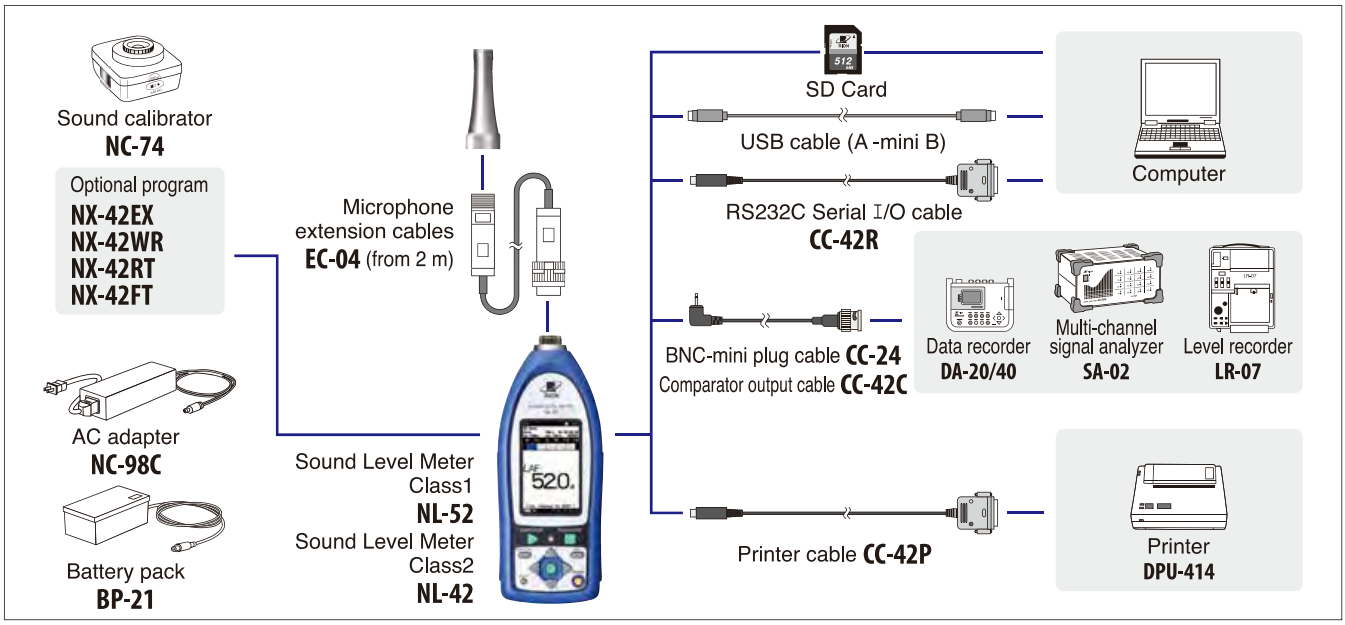
Overlay analysis screen

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

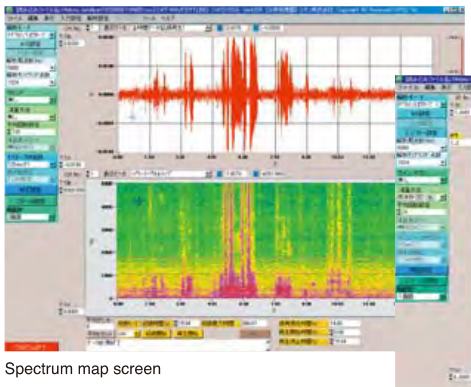
This stand can be used for general acoustic measurements. The sound level meter and microphone can be mounted on the stand.

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

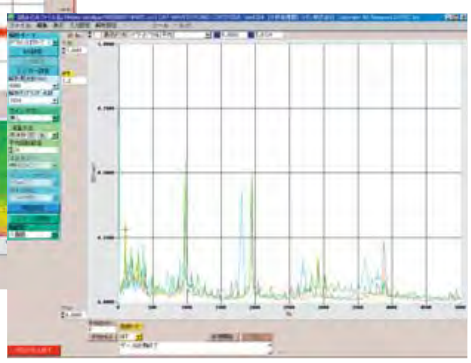
Waveform analysis software

CAT-WAVE (made by CATEC Inc.)

This software analyzes and stores data files (recorded by the NX-42WR) in the WAVE format. You can select to perform FFT analysis or octave band analysis.



Spectrum map screen



Overlapping Screen

Specifications

Waveform	Display function	Scaling of time base, differential and integral calculus
FFT analysis	Analysis points	64 to 32 768 points
	Display function	Power spectrum, cross-spectrum, transfer function (amplitude), transfer function (phase), coherence function, power spectrum map, octave map, differential and integral calculus for spectral areas
Octave band analysis	Applicable standards	IEC 61260 (JIS C 1514) Class 1
	Analysis frequency range	Octave band 0.5 Hz to 8 kHz (15 bands), 1/3 octave band 0.4 Hz to 10 kHz (45 bands), 1/12 octave band 0.36 Hz to 11 kHz (180 bands)

Recommended operating environment

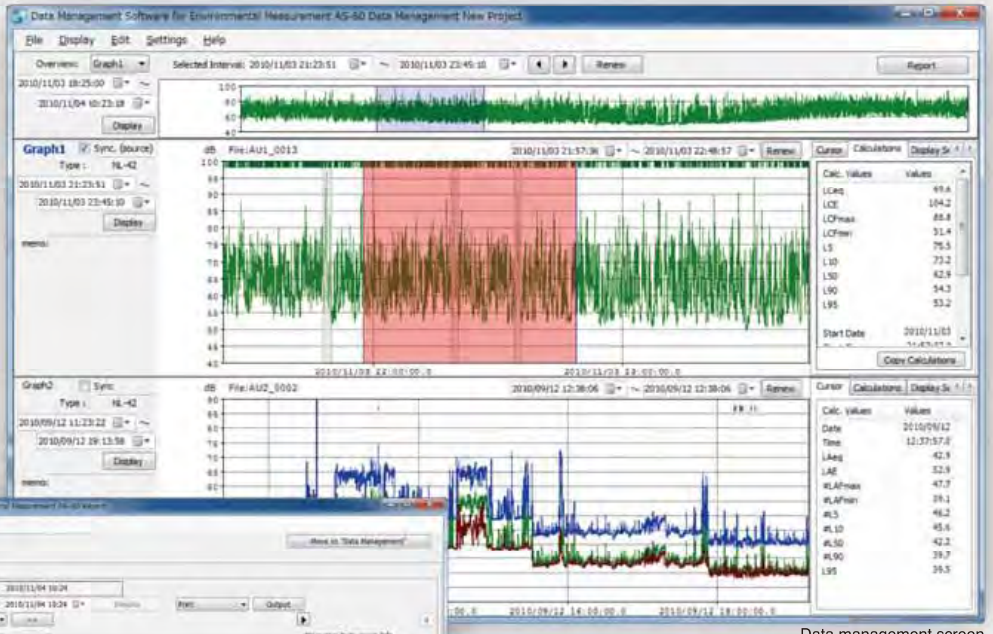
CPU	Intel Core™2 Duo 2.4 GHz or higher
RAM	2 GB or more
HDD	60 GB or more (free space)
DISPLAY	SXGA (1280 × 1024) or more
OS	Microsoft Windows XP Professional 32 bit, Vista Business 32 bit, 7 Professional 32 bit and 64 bit

Complete software for environmental measurements

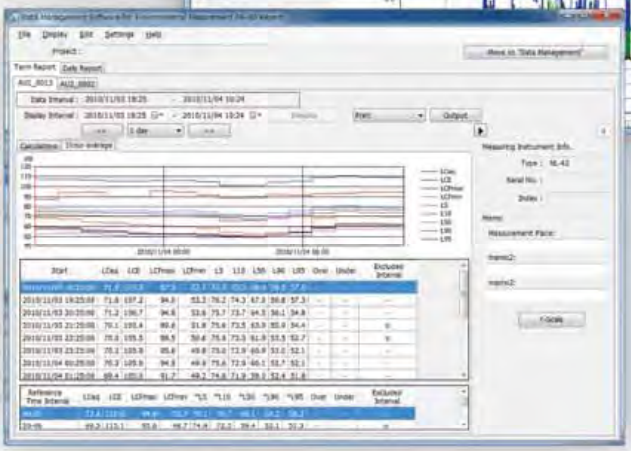
Data management software for environmental measurement AS-60

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

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



Data management screen



Report preparation screen

Supported models

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

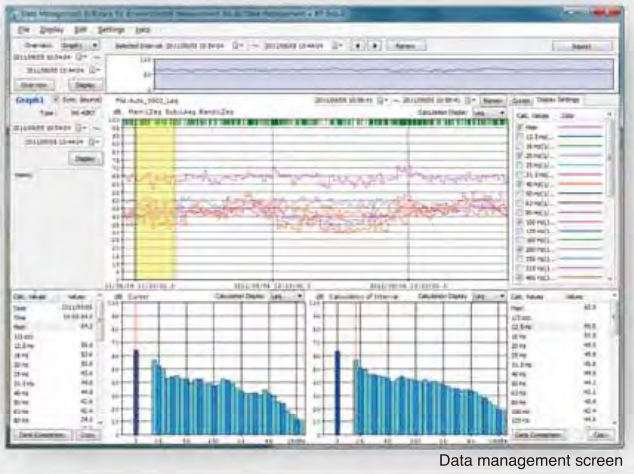
*Only auto store data are supported.

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 (1 024 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 on the NL-52/42, the NX-42EX is also needed.

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 data saved with the NX-62RT/42RT or data measured with the NA-28 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} I-time-weighted equivalent continuous sound level: L_{AIeq} *2 Maximum I-time-weighted equivalent continuous sound level: L_{AImax} *2 The power average of the maximum level of each 5 second interval: L_{Atm5} 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_{Atm5} can be selected. When C-weighting (Z-weighting) is selected, the additional processing L_{Ceq} and L_{Cpeak} (L_{Zpeak}) are selectable.	
Measuring time		10 s, 1, 5, 10, 15, 30 m, 1, 8, 24 h, and manual (maximum 24 h)	
Microphone	Type	UC-59	UC-52
	Sensitivity level	−27 dB	−33 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	
Inherent noise	A-weighting	17 dB or less	19 dB or less
	C-weighting	25 dB or less	27 dB or less
	Z-weighting	30 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 µs (L_p, L_{eq}, L_E, L_{max}, L_{min}, L_{peak} : sampling frequency: 48 kHz) 100 ms (L_N)	
Calibration		Measurement Law: 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 ms, 1, 8, 24 h	
	Measurement Time	Max. 1 000 h (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 DC signals using a frequency weighting characteristic selected by processing.	
	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	L_p	
	Type of data: Processed value	L_{eq}, L_{max}, L_{min}, L_{peak}	
	Output interval	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 MBx1 (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
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	CAT-WAVE
SD Card 512 MB	SD-512M
SD Card 2 GB	SD-2G
AC adapter (100 V to 240 V)	NC-98C
Battery pack	BP-21
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	—
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.

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ISO 9001 RION CO., LTD.

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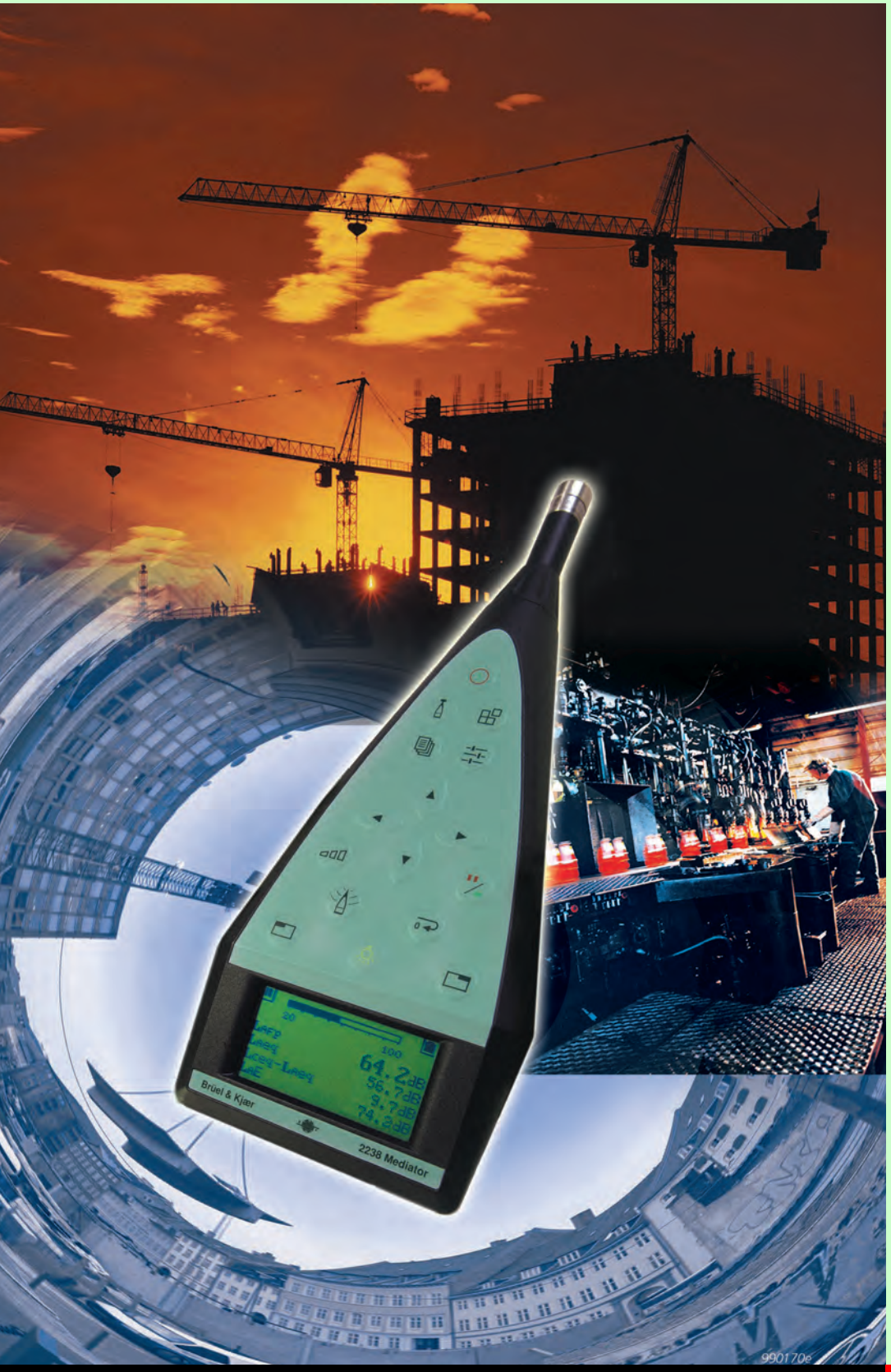
PRODUCT DATA

2238 Mediator™ — Class 1 Integrating Sound Level Meters



When it comes to investing in a sound level meter, it's important to get an instrument that can keep up with you as your measurement requirements expand. 2238 Mediator does just that. Mediator can host a set of dedicated software packages that you can combine in any way you like. As a result you get the functionality you need now, plus the option of adding more later – and your investment is securely protected.

2238 Mediator is the modern interpretation of the classic sound level meter. While providing, as ever, high precision measurements, the many talents of the Mediator come fully into play by installing software modules making the instrument into a dedicated solution to measurement tasks in environmental, occupational and industrial application areas. All Mediators come with Basic Sound Level Meter Software installed, and other functions like statistics, logging and frequency analysis are added through easily installed software options – or you get exactly what you need installed from the factory.

The hardware comes with two independently frequency weighted detectors. These can be used for RMS/ Peak measurements or as two RMS detectors in parallel. All time weighted parameters (using F, S and I time constants) can be computed in parallel. A standard 2 Mbytes of memory is available for storing data. All versions can be fully controlled via the serial interface. Effects of sound incidence (frontal or random) can be corrected by a built-in filter, as can the effects of a windscreen, thus giving you Class 1 precision in all situations.

2238

Brüel & Kjær

USES

- ❍ Environmental noise:
  - – Assessment
  - – Monitoring
  - – Complaints
- ❍ Occupational noise evaluation
- ❍ Selection of hearing protection
- ❍ Noise reduction
- ❍ Product quality control
- ❍ General purpose Class 1 sound measurements

A Range Of Sound Level Meters

Up to four sound level meters in one – a solution for everyone

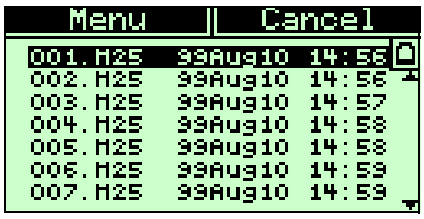
Sound level meters have many uses, ranging from the traditional uses in assessing environmental and workplace noise to industrial quality control and development. With its many options that allow you to tailor 2238 Mediator to suit your exact needs, there is a solution for everyone. These solutions are further enhanced by Brüel & Kjær's post-processing software suite, including 7815 Noise Explorer™ for general noise assessment, 7820 Evaluator™ for environmental noise and 7825 Protector™ for assessing workplace noise.

A range of software packages

2238 Mediator is a whole range of products described in this data sheet. All instruments come with Basic Sound Level Meter Software BZ 7126 installed. This makes the unit into a modern precision integrating sound level meter with simultaneous RMS and Peak measurements, ideal for noise measurements at the workplace and for level checks in any set-up. Three additional standard software packages can be ordered factory-installed or they can be ordered separately at a later date for an instrument upgrade (the software is easily downloaded from any standard PC). The additional software comprises:

- – Enhanced Sound Level Meter Software BZ 7125, adding statistics, back-erase and periodic reports, plus the choice between independently frequency weighted RMS/RMS or RMS/Peak measurements. This is especially valuable for assessments of environmental noise
- – Logging Sound Level Meter Software BZ 7124, which allows free selection of up to 12 parameters to log at intervals from 1 s to 1 h (including two external DC values); alternatively you can log the L_{eq} plus two external values at a 100 ms rate. Results can be logged to a file in Mediator or to the interface. This allows for time histories for use in environmental noise as well as workplace noise
- – Frequency Analysis Software BZ 7123, providing automatic scans of the 1/1- and 1/3-octave filter bands. Time/accuracy optimised dwell times are available as well as the option of averaging up to 99 spectra.

Fig. 1 The potentially large amounts of data are conveniently managed using the file manager's save, recall, print and delete functions



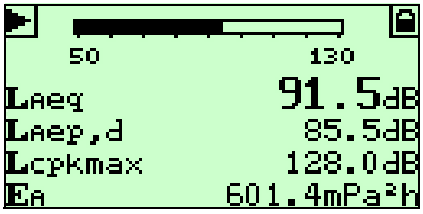
2238 Mediator can have up to four software packages installed. Choose the one to suit your current measurements and start measuring. If your application changes, just switch to a different software package – there is no need to load it into the instrument since it is already resident in the standard 2 Mbytes internal memory. This large memory also allows up to 511 measurements to be stored *per package*.

All combinations of factory installed software packages are available. See page 6 for an overview.

To the Point with Basic Sound Level Meter Software BZ 7126

All Mediators come with the Basic Sound Level Meter Software BZ 7126 installed and is the simplest configuration of the instrument. The BZ 7126 software makes the sound level meter fully equipped to support measurements at the workplace and is also ideal for on the spot level checks in any situation.

Fig. 2 Mediator's display is a 128× 64 pixel graphics display with backlight, shown here in actual size. The display shows a typical Basic Sound Level Meter screen. The parameters displayed are freely selectable during measurements



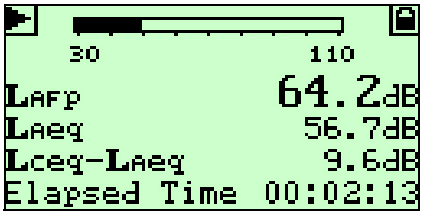
Running the Basic SLM Software allows simultaneous measurements of RMS and Peak levels, each with its own frequency weighting. The available parameters include the L_{eq}, maximum and minimum sound levels and the maximum peak level; occupational health related parameters such as $L_{Aep,d}$, dose percentages and exposure are also available. Measurements can be manually controlled, or the measurement time can be preset, in which case the result is automatically saved after the measurement. With the standard 2 Mbytes memory installed in Mediator, up to 511 individual measurements can be stored at any one time. Saved measurements can be downloaded to PC software, printed or recalled to the display. An integrated file manager makes data management easy – see Fig. 1.

This is precision measurements made simple, which is further enhanced by the ability to save and recall four different setups, making it fast and easy to make sure that the right setup is used (frequency weightings, measurement range, duration, and so on). A measurement can be started automatically at any time within one month.

Digging Deeper with Enhanced Sound Level Meter Software BZ 7125

When assessing environmental noise problems, large amounts of data are often needed. Enhanced Sound Level Meter Software BZ 7125 adds a number of interesting twists to 2238 Mediator in order to supply all necessary data in one shot. All standardised time constants (Fast, Slow, Impulse) are computed in parallel at any time, and on top of that you can choose to run two RMS measurements with independent frequency weightings (typically an A-weighted and a C-weighted RMS channel). You select which parameters to display, print or analyse, but all of them are computed and available at any time and saved with the measurement.

Fig. 3 Sample screen from Enhanced SLM Software BZ 7125. Note that A- and C- weighted values are available simultaneously. Mediator's dual RMS detectors simultaneously compute F, S and I time constants in parallel



Additionally, full statistics are available. Seven L_N values (from L_1 to L_{99}) can be freely selected for display. However, a full level distribution is saved with each measurement and is available for later analysis, for example using a PC running 7820 Evaluator, 7825 Protector or 7815 Noise Explorer software from Brüel & Kjær.

With the enhanced BZ 7125 software the instrument's two auxiliary sockets (generally used for AC and DC output) can be used as inputs to sample a DC voltage. The voltage can be displayed and saved with the measurement, so you might use this feature to include meteorological conditions or a traffic count with your noise data. The auxiliary sockets can also be configured as input/output triggers in order to synchronise measurements with external equipment, for example noise sources.

Fig. 4 Outdoor Gear Type 3592 and Outdoor Microphone Kit UA 1404

Measurements can be manually controlled, or the measurement time can be preset, in which case the results are automatically saved to a file. And the measurement can be set up to repeat 1 – 99 times in a sequence where each measurement is saved when finished and a new measurement is immediately started. This feature can be used to generate a sequence of periodic reports, for example, hourly reports covering 24 hours. As a matter of course this feature can be combined with the auto-start, enabling measurements to start unattended, for example, at midnight, using a specified setup.

When supplemented with Outdoor Gear Type 3592 and Outdoor Microphone Kit UA 1404 (see Fig. 4), 2238 Mediator is ideally suited for short as well as long term unattended measurements. The auto-start feature enables the instrument to start and stop measuring at predefined times, or you can control the instrument via modem (not supplied by Brüel & Kjær).

Time Histories with Logging Sound Level Meter Software BZ 7124

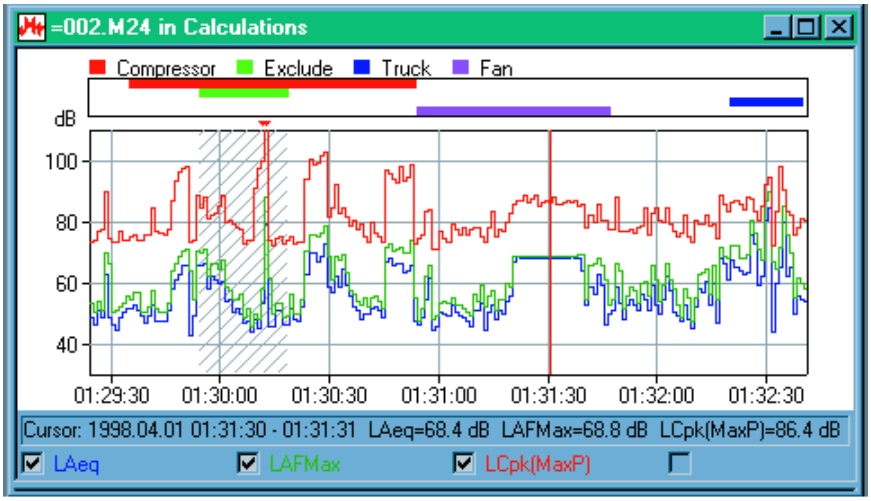
Equipped with Logging SLM Software BZ 7124, 2238 Mediator becomes a versatile instrument for obtaining time histories. You select which of up to 12 parameters to log for each interval (including two DC values). To increase the total available measurement time, select fewer parameters. Whatever you choose, the expected total measurement time with the selected setup is computed on-screen as you make your choices. The instrument can be set up to log the selected parameters at intervals from 1 s to 1 h in 1 s steps. And you can have the results logged to a file (up to 511 of them) or to the serial interface. For detailed profiles of short-term L_{eq}, 2238 Mediator can also be set to log values every 100 ms. In this case the L_{eq} is logged, and optionally two external DC voltages.

For attended measurements, four distinct on-the-fly markers are available. The markers (any of which can be on or off at any one time) are used as an annotation of the obtained data, for example, to point out specific noise sources. When data are transferred to PC software (7815 Noise Explorer, 7820/21 Evaluator or 7825 Protector), these markers are also transferred and immediately available for further analyses. 2238 Mediator runing BZ 7124 can control sound recording while measuring on a PC running 7815 Noise Explorer or 7820/21 Evaluator. Recorded sounds are tagged to a marker and can be replayed from the cursor position in a profile display.

Fig. 5 Logged values annotated with markers using the Logging Sound Level Meter software

The window is a sample screen from 7820 Evaluator or 7821 Evaluator Light software which can directly import Mediator measurement results for further processing. The Evaluator software is dedicated to the assessment of environmental noise, whereas the 7825 Protector software aims at handling noise in the workplace. A general purpose software, 7815 Noise Explorer, is also available for reporting and management of data. All of the post-processing software programs handle all kinds of measurement results from the 2238 Mediator

Types 7815 and 7820/21 support recording of sound controlled by 2238 Mediator with logging software BZ 7124.



Examples of Memory Capacity with Logging SLM Software

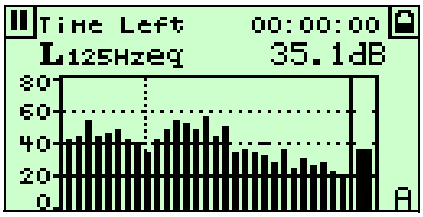
Assuming an empty file system at the start of measurements, Mediator can:

- Log one parameter, for example the L_{eq}, every second for more than a week
- Log four parameters every second for more than 2 days and nights
- Log 12 parameters every 15 minutes for more than 270 days
- Log L_{eq} 10 times per second for more than 17 hours

Getting Detail with Frequency Analysis Software BZ 7123

2238 Mediator's optional 1/1-and 1/3-octave filter set can in all variants be used for measurements in any single frequency band. However, this filter set comes fully into its own when running Frequency Analysis Software BZ 7123. This software automates measurements in the nine octave bands and the 29 1/3-octave bands, making it a simple matter to obtain spectra in order to, for example, select hearing protection, qualify heat and ventilation systems, and assess low or high frequency contents.

Fig. 6 Example of a frequency analysis in 1/3-octaves. L_{eq}, L_{Min}, and L_{Max} can be displayed for each frequency band



As a user you select the bandwidth and the start and stop band, and can select one of the available time/accuracy optimised scan programs (providing you with tolerances of 0.25, 0.5 or 1.0 dB). The bar graph display is updated as the measurement progresses. In addition to making one scan, you can average up to 99 spectra into one resulting average spectrum. Alternatively, a fixed user-defined dwell time for all chosen frequency bands can be selected. In each frequency band L_{eq}, L_{Min} and L_{Max} are measured using time constant F or S. A simultaneous overall broadband measurement is made during the scan(s) of the filter set.

If interrupting noise occurs during a measurement, the current measurement (scan) can be paused, providing you with the opportunity to back-erase, that is, delete one or more of the already measured frequency bands and continue the measurement from there.

Outline of the Software Modules

The table below presents a summary of the characteristics of each of the software modules available with 2238 Mediator. Detailed specifications are found on page 7 to page 11.

Note that 2238 Mediator is always delivered with Basic Sound Level Meter Software BZ 7126 installed. Mediator can be ordered with any combination of additional software modules. See Ordering Information.

Feature	BZ 7126 Basic SLM	BZ 7125 Enhanced SLM	BZ 7124 Logging SLM	BZ 7123 Frequency Analysis
Class 1 to latest IEC and ANSI standards	●	●	●	●
4 setups can be stored (for each software)	●	●	●	●
4 auto-starts up to one month in advance (shared)	●	●	●	●
Automatic data storage with preset measurement time	●	●	●	●
Saves up to 511 files (for each software)	●	●	●	●
Calibration history, initial and 20 latest calibrations (shared)	●	●	●	●
Frontal/random and windscreen correction filters	●	●	●	●
Serial interface control	●	●	●	●
AC and DC outputs	●	●	●	●
Criterion level (70 – 100 dB), threshold level (0 – 100 dB)	●	●		
Exposure, dose and $L_{Aep,d}$	●	●		
Back-erase (5, 10, 15 s)		●		
Measurement sequence, periodic reports		●		
L_{Ceq}–L_{Aeq}, L_{Aleq}–L_{Aeq}, L_{AFTm5}–L_{Aeq}		●		
RMS/RMS or RMS/Peak		●	●	
All time weightings simultaneously (F, S, I)		●	●	
Statistics		●	●	
Two DC inputs for external parameters		●	●	
Logging of up to 12 parameters, 1 s to 1 h intervals			●	
Logging of L_{eq} and DC inputs, 100 ms interval			●	
Four markers available for annotation			●	
Control of sound recording on PC			●	
Data output to file or interface			●	
Automatic scan of 1/1- and 1/3-octave bands				●
Time/accuracy optimised dwell times				●
Fixed dwell times, 1 s to 1 h				●
Bar-graph display with cursor read-out				●
Back-erase in current spectrum				●
Averaging of spectra				●
Trigger input/output for synchronising		●	●	●

Specifications Common to all 2238 Mediator Variants

Specifications apply to 2238 Mediator fitted with the supplied microphone and preamplifier

STANDARDS
Conforms with the following:
- o IEC 60651 Type 1, 1979 & Amendment 1 1993 & Amendment 2 2000
- o IEC/EN 61672 – Draft March 1998 Class 1
- o EN 60651 Type 1
- o EN 60804 Type 1
- o ANSI S1.4–1983 Type S1
- o ANSI S1.43–1997 Type 1

SUPPLIED MICROPHONE
Type 4188 Prepolarized Free-field 1/2" Condenser Microphone
Nominal Sensitivity: –30 dB re 1 V/Pa or 31.6 mV/Pa
Frequency Range: 8 Hz–16 kHz ±2 dB
Capacitance: 12 pF

MICROPHONE PREAMPLIFIER
ZC 0030
Extension Cables: Available in lengths of 3 m and 10 m. No recalibration is required

MEASURING RANGES
Dynamic Range: 80 dB, adjustable to give full-scale readings from 80 to 140 dB in 10 dB steps
Max. Peak Level: 3 dB above full scale reading
Upper Limit (RMS) for Crest Factor = 10: 17 dB below full scale reading
Pulse Range: 83 dB
Linear operating ranges (broadband):
For the individual level ranges, at 1 kHz, the nominal upper boundary level minus the lowest sound pressure level measurable with a noise margin of 5 dB.
With a Microphone Type 4188 of nominal sensitivity:

Upper limit	Lower limit	Max. peak level	Upper limit (CF=10)
140 dB	60 dB	143 dB	123 dB
130 dB	50 dB	133 dB	113 dB
120 dB	40 dB	123 dB	103 dB
110 dB	30 dB	113 dB	93 dB
100 dB	25 dB	103 dB	83 dB
90 dB	25 dB	93 dB	73 dB
80 dB	25 dB	83 dB	63 dB

INHERENT NOISE LEVEL
This is due to the combination of electrical noise and microphone thermal noise at 20° C (68° F). Typical values with supplied microphone of nominal sensitivity (in dB):

Weighting	Electrical noise (2238)	Thermal noise (4188)	Combined noise
"A"	14 dB	14.2 dB	17.1 dB
"C"	17 dB	13.2 dB	18.5 dB
Lin. 5 Hz – 20 kHz	22 dB	14.5 dB	22.7 dB

DISPLAY
128 pixel×64 pixel dot matrix display with backlight

AUTO-START
Mediator supports a total of four timers which allow setup of measurement start times up to a month in advance

CALIBRATION
Semi-automatic, using Sound Level Calibrator Type 4231 or Multifunction Acoustic Calibrator Type 4226.
The initial factory calibration (sensitivity and microphone serial number) is stored for comparison with later calibrations. When using the supplied microphone the maximum allowed deviation from the initial sensitivity is ±1.5 dB. An unspecified microphone can be chosen during calibration, in which case calibration can be made with practically any sensitivity.
Stored Calibration History: 20 latest calibrations plus initial calibration

MEMORY
2 Mbytes. Up to 511 measurements can be stored by each loaded software module, including time stamp, complete setup and calibration data

SERIAL PRINTER
Measurement data can be printed on Portable Printer Type 2322 or on an IBM® Proprinter-compatible printer

CLOCK
Real-time (calendar)

SERIAL INTERFACE
Conforms to EIA/TIA 574 (RS–232), coupled as Data Terminal Equipment (DTE). Cable (AO 1442) is included
Connector: 9–pin D-type male
Baud Rates: 4800, 9600, 19200, 38400 and 115200
Word Length: 8 bits, no parity, 1 stop bit
Handshake: Hardwired, modem

SETTLING TIME
From Power On: <10 s

ENVIRONMENTAL EFFECTS
Storage Temperature: –25 to +70°C (–13 to + 158°F)
Operating Temperature: –10 to +50°C (14 to 122°F)
Effect of Temperature: < 0.5 dB (–10 to +50°C)
Effect of Humidity: < 0.5 dB for 30%< RH< 90% (at 40°C, 1 kHz)

BATTERIES
Four 1.5 V LR6/AA alkaline cells
Lifetime (at room temperature): Typically > 10 h (with filter set selected typically > 7 h)

EXTERNAL DC POWER SUPPLY
Voltage: Regulated 7 to 15 V
Power: Approximately 150 mA at 7 V (approximately 210 mA with filter set selected)

WEIGHT AND DIMENSIONS
460 g (1 lb 2 oz) (with batteries), 257×97×41 mm

LANGUAGE
Each instrument is loaded with English, German, French, Italian and Spanish text. You can select one of these languages at any time

Compliance with Standards

CE C-Tick	CE-mark indicates compliance with: EMC Directive and Low Voltage Directive. C-Tick mark indicates compliance with the EMC requirements of Australia and New Zealand
Safety	EN 61010–1 and IEC 61010–1: Safety requirements for electrical equipment for measurement, control and laboratory use. UL 3111–1: Standard for Safety – Electrical measuring and test equipment
EMC Emission	EN 50081–1: Generic emission standard. Part 1: Residential, commercial and light industry. EN 50081–2: Generic emission standard. Part 2: Industrial environment. CISPR 22: Radio disturbance characteristics of information technology equipment. Class B Limits. FCC Rules, Part 15: Complies with the limits for a Class B digital device.
EMC Immunity	EN 50082-1: Generic immunity standard. Part 1: Residential, commercial and light industry. RF immunity implies that sound level indications of 45 dB or greater will be affected by no more than 0.5 dB. EN 50082-2: Generic immunity standard. Part 2: Industrial environment. RF immunity implies that sound level indications of 60 dB or greater will be affected by no more than 0.5 dB. These levels of immunity are 14 dB better than required by IEC/EN 61672 (Draft). **Note:** The above conformance is guaranteed only when using accessories listed in this Product Data sheet.

Specifications with BZ 7126 Basic SLM Software

DETECTORS
Simultaneous detection of RMS and Peak with independent frequency weightings
RMS: Three selectable exponential time weightings (Fast, Slow, Impulse) and a linear averaging detector. Selectable frequency weighting A, C or Lin
Peak: Selectable frequency weighting C or Lin
Overload Detector: Monitors all the frequency weighted channels
Exchange Rate: 3 dB. In addition, 4 or 5 dB can be selected
Criterion Level: Can be set in the range 70 – 100 dB
Threshold Level: Can be set in the range 0 – 100 dB

SAMPLE RATE
160 Hz

DISPLAY
Measurement Display: Range and quasi-analogue bar, plus four measurement parameters that can be freely selected from all available parameters during measurements

MEASUREMENT CONTROL
Manual control, or pre-set measurement time in the range 1½½½½ s – 24 h with automatic storage of measurement

Aux 1 OUTPUT
Connector: LEMO coaxial
AC Output Signal: Range-adjusted AC output, unweighted or with the frequency weighting selected on the RMS detector. Short-circuit protected
Output: 1 VRMS corresponding to full-scale indication
Max. Load: 10 kΩ‖1 nF
Output Impedance: Typically 100 Ω

Aux 2 OUTPUT
Connector: LEMO coaxial
DC Output Signal: DC version of signal on the RMS detector (delayed 0.8 s)
(Fast, Inst). Short-circuit protected
Output: 0 to 4.0 V DC (50 mV/dB)
Update Rate: 160 times per second
Max. Load: 10 kΩ‖1 nF
Output Impedance: Typically 100 Ω

MEASUREMENTS

L_{XYp}	L_{XYInst}	L_{XYMax}
L_{XYMin}	L_{Xeq}	L_{XIeq}
LA_{ZavQ}	$L_{Aep,d}$	E_A
$Dose\%_A$	$Dose\%_{AZQ}$	L_{AE}
L_{Vpk}	L_{Vpkmax}	$\#_V$Peaks
Overload%	Underrange%	Elapsed time
Start time	Start date	Time

Legend:
V = Frequency weighting C or L
X = Frequency weighting A, C or L
Y = Time weighting F, S, or I
Z = Time weighting F or S
Q = Exchange rate 4 or 5 dB (additional to the 3 dB exchange rate)

Specifications with BZ7125 Enhanced SLM Software

DETECTORS
Two detectors with independent frequency weightings. One detector is an RMS detector, the other can be set up as a Peak detector or as an additional RMS detector, allowing two independently weighted RMS detectors in parallel, each providing three exponential time weightings in parallel.
RMS: Three simultaneous exponential time weightings (Fast, Slow, Impulse) and a linear averaging detector. Selectable frequency weighting A, C or Lin
Peak: Selectable frequency weighting C or Lin
Overload Detector: Monitors all the frequency weighted channels
Exchange Rate: 3 dB. In addition, 4 or 5 dB can be selected
Criterion Level: Can be set in the range 70 – 100 dB
Threshold Level: Can be set in the range 0 – 100 dB

SAMPLE RATE
160 Hz, statistics sampled at 40 Hz

DISPLAY
Measurement Display: Range and quasi-analogue bar, plus four measurement parameters that can be freely selected from all available parameters during measurements. Where applicable, frequency and time weighting of selected parameter are selected with softkey.
Separate display for back-erase.

MEASUREMENT CONTROL
Manual control, or pre-set measurement time in the range 30 s – 100 h with automatic storage of measurement
Measurement Sequences:
Mediator can be set up to make a sequence of individual measurements (up to 99) in immediate succession

Aux 1 SOCKET
Connector: LEMO coaxial.
Can be used as an AC output or a DC input for an external signal
AC Output Signal:
Range-adjusted AC output, unweighted or with the frequency weighting selected on RMS detector 1. Short-circuit protected
Output: 1 V RMS corresponding to full-scale indication
Max. Load: 10 kΩ ‖ 1 nF
Output Impedance: Typically 100 Ω
DC Input:
Voltage Range: 0 to 4 V (max. –1 to 6 V)
Resolution: 5 mV (800 steps)

Aux 2 SOCKET
Connector: LEMO coaxial.
Can be used as a DC output, a DC input for an external signal, a trigger input or a trigger output
DC Output Signal:
DC version of the signal on RMS detector 1 (Fast, Inst) (delayed 0.8 s). Short-circuit protected
Output: 0 to 4.0 V DC (50 mV/dB)
Update Rate: 160 times per second
Max. Load: 10 kΩ ‖ 1 nF
Output Impedance: Typically 100 Ω
DC Input:
Voltage Range: 0 to 4 V (max. –1 to 6 V)
Resolution: 5 mV (800 steps)
Trigger Input:
Voltage Range: 0 to 4 V (max. –1 to 6 V)
Trigger Level: 2 V, duration > 12.5 ms
Trigger Output:
Level: 4 V
Duration: Throughout measurement

MEASUREMENTS

L_{XYp}	L_{XYInst}	L_{AFT5}
L_{XYMax}	L_{XYMIN}	L_{XYN}
L_{Xeq}	L_{Xleq}	L_{AFTm5}
$L_{Ceq} - L_{Aeq}$	$L_{Aleq} - L_{Aeq}$	$L_{AFTm5} - L_{Aeq}$
L_{AZavQ}	$L_{Aep,d}$	E_A
$Dose\%_A$	$Dose\%_{AZQ}$	L_{AE}
L_{Vpk}	L_{Vpkmax}	$\#_V$Peaks
AUX 1	AUX 2	Overload%
Underrange%	Elapsed time	
Start time	Start date	Time

Legend:
V = Frequency weighting C or L
X = Frequency weighting A, C or L
Y = Time weighting F, S and I
Z = Time weighting F and S
Q = Exchange rate 4 dB or 5 dB (additional to the 3 dB exchange rate)

Note 1: When both detectors are set to RMS, it is not possible to select the same frequency weighting for the two detectors.
Note 2: Time weightings F, S and I are available simultaneously.
Note 3: If the Aux 1 and Aux 2 sockets are used for input, the signal(s) can be displayed and stored.
Note 4: Values for statistics are sampled 40 times a second and are derived from the signal on the RMS detector with a preselected time weighting (F, S or I). The class width is 0.5 dB. Seven percentiles ($L_{XYN,T}$) are available during measurement at user-selectable levels (1% – 99%).
A complete level distribution is stored.

Specifications with BZ7124 Logging SLM Software

DETECTORS
Two detectors with independent frequency weightings. One detector is an RMS detector; the other can be set up as a Peak detector or as an additional RMS detector, allowing two independently weighted RMS detectors in parallel, each providing three exponential time weightings in parallel.
RMS: Three simultaneous exponential time weightings (Fast, Slow, Impulse) and a linear averaging detector. Selectable frequency weighting A, C or Lin
Peak: Selectable frequency weighting C or Lin
Overload Detector: Monitors all the frequency weighted channels
Exchange Rate: 3 dB. In addition, 4 or 5 dB can be selected

SAMPLE RATE
160 Hz, statistics sampled at 40 Hz

DISPLAY
Measurement Display, current log period: Range and quasi-analogue bar, plus four measurement parameters that can be freely selected from all available parameters during measurements.
Measurement Display, overall: Range and quasi-analogue bar, plus four measurement parameters that can be freely selected from all available parameters during measurements

MEASUREMENT CONTROL
Manual control, or pre-set measurement time with automatic storage of measurement

Aux 1 SOCKET
Connector: 2 pin LEMO. Can be used as an AC output or a DC input for an external signal
AC Output Signal:
Range-adjusted AC output, unweighted or with the frequency weighting selected on RMS detector 1. Short-circuit protected
Output: 1 V RMS corresponding to full-scale indication
Max. Load: 10 kΩ || 1 nF
Output Impedance: Typically 100 Ω
DC Input:
Voltage Range: 0 to 4 V (max. –1 to 6 V)
Resolution: 5 mV (800 steps)

Aux 2 SOCKET
Connector: LEMO coaxial.
Can be used as a DC output, a DC input for an external signal, a trigger input or a trigger output
DC Output Signal:
DC version of the signal on RMS detector 1 (Fast, Inst) (delayed 0.8 s). Short-circuit protected
Output: 0 to 4.0 V DC (50 mV/dB)
Update Rate: 160 times per second
Max. Load: 10 kΩ || 1 nF
Output Impedance: Typically 100 Ω
DC Input:
Voltage Range: 0 to 4 V (max. –1 to 6 V)
Resolution: 5 mV (800 steps)
Trigger Input:
Voltage Range: 0 to 4 V (max. –1 to 6 V)
Trigger Level: 2 V, duration > 12.5 ms
Trigger Output:
Level: 4 V
Duration: Throughout measurement

MEASUREMENTS
Parameters logged and stored in each interval (when selected):

L_{XYMax}	L_{XYMIN}	L_{XYN}
L_{Xeq}	L_{Xleq}	L_{AFTm5}
L_{AZavQ}	L_{Vpkmax}	$\#_V$Peaks
AUX 1	AUX 2	Marker settings

Parameters in overall measurement:

L_{XYp}	L_{XYInst}	L_{XYMax}
L_{XYMIN}	L_{Xeq}	L_{Xleq}
L_{Vpk}	L_{Vpkmax}	$\#_V$Peaks
Overload%	Underrange%	Elapsed time
Start time	Start date	Time

Legend:
V = Frequency weighting C or L
X = Frequency weighting A, C or L
Y = Time weighting F, S and I
Z = Time weighting F and S
Q = Exchange rate 4 dB or 5 dB (additional to the 3 dB exchange rate)

Note 1: When both detectors are set to RMS, it is not possible to select the same frequency weighting for the two detectors.
Note 2: Time weightings F, S and I are available simultaneously.
Note 3: If the Aux 1 and Aux 2 sockets are used for input, the signal(s) can be displayed and logged.
Note 4: Values for statistics are sampled 40 times a second and are derived from the signal on the RMS with a preselected time weighting (F, S or I). The class width is 0.5 dB. Seven percentiles ($L_{XYN,T}$) are available during measurement at user-selectable levels (1% – 99%).

Specifications with BZ 7123 Frequency Analysis Software

DETECTORS
Simultaneous detection of spectrum and broadband parameters
Spectrum: 1/1-octave and 1/3-octave band filters with two exponential time weightings (Fast, Slow) and a linear averaging detector
Broadband: Two selectable exponential time weightings (Fast, Slow) and a linear averaging detector
Selectable frequency weighting: A, C or Lin
Overload Detector: Monitors all the frequency weighted channels

SAMPLE RATE
160 Hz

DISPLAY
Spectrum: Bargraph display of current and averaged spectrum with cursor read-out plus broadband channel. L_{eq}, L_{Min} and L_{Max} can be selected for graphic display and read-out.
Broadband measurement: Range and quasi-analogue bar, plus four measurement parameters that can be freely selected from all available parameters during measurements

MEASUREMENT CONTROL
Time/accuracy optimised scan time at three confident levels (0.25, 0.5 or 1.0 dB), or manually selected dwell time in the range 1 s to 1 h
User selected number of scans (in the range 1 – 99) averaged into one resulting spectrum

Aux 1 OUTPUT
Connector: LEMO coaxial
AC Output Signal: Range-adjusted AC output, filtered through the currently selected band.
Short-circuit protected
Output: 1 V RMS corresponding to full-scale indication
Max. Load: 10 kΩ || 1 nF
Output Impedance: Typically 100 Ω

Aux 2 OUTPUT
Connector: LEMO coaxial
DC Output Signal: DC version of the signal on the RMS detector (Fast, Inst), filtered through the currently selected band (delayed 0.8 s). Short-circuit protected
Output: 0 to 4.0 V DC (50 mV/dB)
Update Rate: 160 times per second
Max. Load: 10 kΩ || 1 nF
Output Impedance: Typically 100 Ω

FILTER SET SPECIFICATIONS (ZT 0328)

STANDARDS
Conforms with the following:
IEC/EN 61260 (1995) Octave and 1/3-octave Bands Class 1
ANSI S1.11–1986 Octave and 1/3-octave Bands, Order 3, Type 1D

OCTAVE AND 1/3-OCTAVE BAND FILTERS
Nominal 1/1-octave Band Centre Frequencies: 31.5 Hz, 63 Hz, 125 Hz, 250 Hz, 500 Hz, 1 kHz, 2 kHz, 4 kHz and 8 kHz
Nominal 1/3-octave Band Centre Frequencies: 20 Hz, 25 Hz, 31.5 Hz, 40 Hz, 50 Hz, 63 Hz, 80 Hz, 100 Hz, 125 Hz, 160 Hz, 200 Hz, 250 Hz, 315 Hz, 400 Hz, 500 Hz, 630 Hz, 800 Hz, 1 kHz, 1.25 kHz, 1.6 kHz, 2 kHz, 2.5 kHz, 3.15 kHz, 4 kHz, 5 kHz, 6.3 kHz, 8 kHz, 10 kHz and 12.5 kHz

MEASUREMENTS
Parameters measured in each frequency band:

L_{eq}	L_{ZMax}	L_{ZMIN}

Parameters in concurrent broadband measurement:

L_{XZp}	L_{XZInst}	L_{XZMax}
L_{XZMIN}	L_{Xeq}	Overload%
Underrange%	Elapsed time	Start time
Start date	Time	

Legend:
X = Frequency weighting A, C or L
Z = Time weighting F or S

Ordering Information

Type 2238-X (see exact order number from table)

Order number		BZ 7126 Basic SLM	BZ 7125 Enhanced SLM	BZ 7124 Logging SLM	BZ 7123 Frequency Analysis
2238–A*	**Mediator**	●			
2238–B*	**Mediator**	●	●		
2238–C*	**Mediator**	●	●	●	
2238–D	**Mediator**	●			●
2238–E	**Mediator**	●	●	●	●
2238–F*	**Mediator**	●		●	
2238–G	**Mediator**	●	●		●
2238–H	**Mediator**	●		●	●

* Add "F" to include a 1/1-and 1/3-octave band filter set allowing you to select a frequency band as a frequency weighting.
Select models 2238–D, –E, –G, or –H to include automatic frequency analysis with a pre-installed filter set. Later upgrade with the frequency analysis software BZ 7123 possible for other models with a filter set installed.

In addition to the above order numbers, complete systems can be ordered at special prices. A typical system would consist of:
- 2238 Mediator
- PC post-processing software (Type 7815 Noise Explorer, Type 7820/21 Evaluator or Type 7825 Protector, as applicable)
- Sound Level Calibrator Type 4231
- Tripod UA 1251
- Windscreen UA 0237

Please contact your local Brüel & Kjær representative for information.

Accessories Included

Type 4188	Prepolarized Free-field 1/2" Condenser Microphone
ZC 0030	Microphone Preamplifier
AO 1442	RS–232 Null Modem Cable
KE 0323	Shoulder Bag
UA 1236	Protective Cover
QB 0013	4 Alkaline Batteries

Services Available With Delivery

2238 CAF	Accredited Calibration
2238 CAI	Accredited Initial Calibration For models with a filter set installed, order ZT 0328 CAI in addition

Optional Accessories

Type 7815	Noise Explorer Software
Type 7820	Evaluator Software
Type 7821	Evaluator Light Software
Type 7825	Protector Software
Type 4231	Sound Level Calibrator
Type 4226	Multifunction Acoustic Calibrator
Type 3592	Outdoor Gear
UA 1404	Outdoor Microphone Kit
Type 2322 A	Portable Printer (European version)
Type 2322 B	Portable Printer (UK version)
Type 2322 C	Portable Printer (US version)
UA 1251	Lightweight Tripod
UA 0237	Windscreen (90 mm)
AO 0560	Microphone Extension Cable (10 m)
AO 0561	Microphone Extension Cable (3 m)
AO 0585	Cable from 2238 to audio input on a PC
UA 1254	Microphone Cable Holder (for tripod)
AO 0403	LEMO to BNC Cable (output/input cable)
ZG 0386	Power Supply (European version)
ZG 0387	Power Supply (UK version)
ZG 0388	Power Supply (US version)
KE 0325	Carrying Case (with insert for Sound Level Meter, Calibrator Type 4231, Portable Printer Type 2322 or Windscreen UA 0237, and Tripod UA 1251)

Upgrades

2238 MUF	1/1- and 1/3-octave band filter set with installation (Upgrade of models 2238–A, –B, –C and –F) Must be installed at a Brüel & Kjær service centre
BZ 7125	Enhanced Sound Level Meter Software Upgrade of models 2238–A, –A–F, –D, –F, –F–F and –H)
BZ 7124	Logging Sound Level Meter Software (Upgrade of models 2238–A, –A–F, –B, –B–F, –D and –G)
BZ 7123	Frequency Analysis Software (Upgrade of models 2238–A–F, –B–F, –C–F and –F–F)

Software upgrades are delivered on disk, including installation program; can be installed by the user. License certificate and additional manual included. Serial number of instrument must be stated when ordering software upgrades

Brüel & Kjær reserves the right to change specifications and accessories without notice

01/01

BP 1776–12

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Switzerland (0)1 880 70 35 · Taiwan (02)7139303 · United Kingdom (0) 1438 739 000 · USA 800 332 2040
Local representatives and service organisations worldwide

Brüel & Kjær

RION

Sound Calibrator
NC-74

Compact and lightweight unit requires no atmospheric pressure compensation

- Compliant with IEC 60942:2003 class 1 and JIS C1515:2004 class 1
- Allows calibration of 1-inch and 1/2-inch microphones
- No need for atmospheric pressure compensation
- Frequency 1 kHz, SPL 94 dB

CE

How to use

Carefully insert the microphone all the way into the coupler of the NC-74. Then simply turn the power on to apply a constant sound pressure level to the diaphragm of the microphone.


Usage example (NL series)

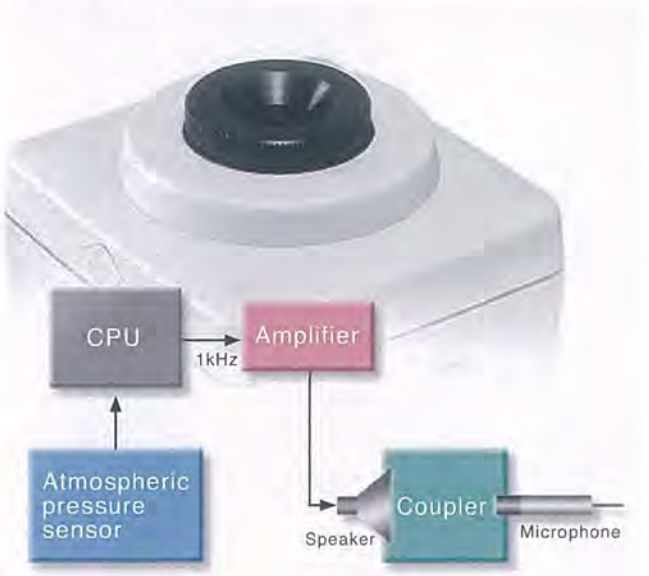
The performance of the NC-74 is suitable for calibration of high-precision sound level meters.
The unit is compact, lightweight, and easy to use. Two IEC LR6 (size AA) alkaline batteries will power the unit for more than 30 hours of continuous use at room temperature.

Using the 1/2-inch adapter

To allow calibration of sound level meter microphones with 1 inch diameter, the 1/2-inch microphone adapter can be removed. 1/2-inch microphones are calibrated with the adapter in place.

Atmospheric pressure compensation principle

The NC-74 incorporates a sensor that detects atmospheric pressure. Based on the information provided by the sensor, the CPU controls the signal amplitude. This allows the unit to always provide the correct output for achieving constant sound pressure level, regardless of fluctuations in atmospheric pressure.



Specifications

Applicable standards	IEC 60942:2003 class 1 JIS C1515:2004 class 1	
Suitable microphones	1-inch microphones	IEC 61094-1 Type LS1P UC-27 UC-25 UC-34
	1/2-inch microphones	IEC 61094-1 Type LS2aP UC-59 UC-57 UC-52 UC-26 UC-30 UC-31 UC-33P
Nominal sound pressure level	94 dB	
Sound pressure level tolerance	±0.3 dB	
Nominal frequency	1 kHz	
Frequency tolerance	±1.0 % or less	
Power requirements	IEC LR6 (size AA) alkaline battery × 2	
Dimensions, mass	Approx. 49 (H) × 80 (W) × 74 (D) mm Approx. 200 g (including batteries)	
Supplied accessories	Case × 1 IEC LR6 (size AA) alkaline battery × 2 1/2-inch microphone adapter NC74S10 × 1	

ILAC-MRA IAJapan JCSS 0197 JCSS

RION Co., Ltd. is recognized by the JCSS which uses ISO/IEC 17025 (JIS Q 17025) as an accreditation standard and bases its accreditation scheme on ISO/IEC 17011. JCSS is operated by the accreditation body (IA Japan) which is a signatory to the Asia Pacific Laboratory Accreditation Cooperation (APLAC) as well as the International Laboratory Accreditation Cooperation (ILAC). The Quality & Environmental Management system Center of RION Co., Ltd. is an international MRA compliant JCSS operator with the accreditation number JCSS 0197.

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

* Specifications subject to change without notice.

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0510-3 1511.P.D

PRODUCT DATA

Sound Calibrator Type 4231

Sound Calibrator Type 4231 is a handy, portable sound source for calibration of sound level meters and other sound measurement equipment. The calibrator is very robust and stable, and conforms to EN/IEC 60942 (2003) Class LS and Class 1, and ANSI S1.40–2006.

Uses and Features

Uses

- Calibration of sound level meters and other sound measurement equipment

Features

- Conforms to EN/IEC 60942 (2003) Class LS and Class 1, and ANSI S1.40–2006
- Robust, pocket-sized design with highly stable level and frequency
- Calibration accuracy ±0.2 dB
- 94 dB SPL or 114 dB SPL for calibration in noisy environments
- Extremely small influence of static pressure and temperature
- Sound pressure independent of microphone equivalent volume
- 1 kHz calibration frequency for correct calibration level independent of weighting network
- Fits Brüel & Kjær 1″ microphones (1/2″, 1/4″ and 1/8″ microphones with adaptor)
- Switches off automatically when removed from the microphone

Sound Calibrator Type 4231

Sound Calibrator Type 4231 is a pocket-sized, battery operated sound source for quick and direct calibration of sound level meters and other sound measuring systems. It fits Brüel & Kjær 1″ microphones and using the removable adaptor, 1/2″ microphones. With optional adaptors, it can be used for 1/4″ and 1/8″ microphones as well.

The calibration frequency is 1000 Hz (the reference frequency for the standardized international weighting networks), so the same calibration value is obtained for all weighting networks (A, B, C, D and Linear). The calibration pressure of 94 ±0.2 dB re 20 µPa is equal to 1 Pa or 1 N/m^2. The +20 dB level step gives 114 dB SPL, which is convenient for calibration in noisy environments, or for checking linearity.

The design of Type 4231 is based on a feed-back arrangement to ensure a highly stable sound pressure level and ease of use. The feed-back loop uses a condenser microphone (see Fig. 1), which is specially developed for this purpose.

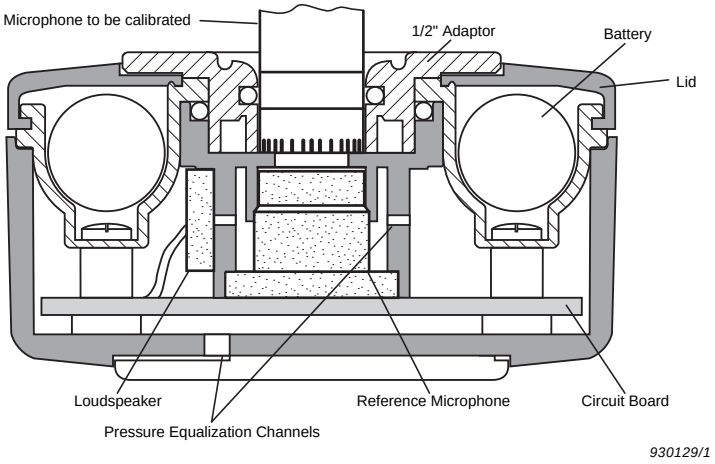

Fig. 1
Cross-sectional view of Sound Calibrator Type 4231. The feed-back loop is based on a high-quality condenser microphone to ensure a very stable sound pressure level

This microphone is optimized to have extremely high stability and independence of variations in static pressure and temperature around the 1 kHz calibration frequency. The result of this is a user-friendly calibrator where exact fitting of the microphone is not critical and the effects of changes in temperature and static pressure are negligible.

Fig. 2
Type 4231 fitted to Hand-held Analyzer Type 2250. The calibrator's centre of gravity is positioned very close to the microphone, giving a stable set-up

The calibrator gives a continuous sound pressure level when fitted on a microphone (see Fig. 2) and activated.

The sensitivity of the sound measuring equipment can then be adjusted until it indicates the correct sound pressure level.

The calibrator is automatically switched off when removed from the microphone.

A leather protection case, which does not need to be removed to use the calibrator, is supplied.

Compliance with Standards

	The CE marking is the manufacturer's declaration that the product meets the requirements of the applicable EU directives RCM mark indicates compliance with applicable ACMA technical standards – that is, for telecommunications, radio communications, EMC and EME China RoHS mark indicates compliance with administrative measures on the control of pollution caused by electronic information products according to the Ministry of Information Industries of the People's Republic of China WEEE mark indicates compliance with the EU WEEE Directive
Safety	EN/IEC 61010–1: Safety requirements for electrical equipment for measurement, control and laboratory use. ANSI/UL 61010–1: Safety requirements for electrical equipment for measurement, control and laboratory use.
EMC Emission	EN/IEC 61000–6–3: Generic emission standard for residential, commercial and light industrial environments. EN/IEC 61000–6–4: Generic emission standard for industrial environments. CISPR 22: Radio disturbance characteristics of information technology equipment. Class B Limits. FCC Rules, Part 15: Complies with the limits for a Class B digital device. EN/IEC 60942: Instrumentation Standard – Electroacoustics – Sound Calibrators.
EMC Immunity	EN/IEC 61000–6–1: Generic standards – Immunity for residential, commercial and light industrial environments. EN/IEC 61000–6–2: Generic standards – Immunity for industrial environments. EN/IEC 61326: Electrical equipment for measurement, control and laboratory use – EMC requirements. EN/IEC 60942: Instrumentation Standard – Electroacoustics – Sound Calibrators. **Note:** The above is only guaranteed using accessories listed in this Product Data sheet.
Temperature	IEC 60068–2–1 & IEC 60068–2–2: Environmental Testing. Cold and Dry Heat. Operating Temperature: –10 to +50°C (14 to 122°F) Storage Temperature: –25 to +70°C (–13 to +158°F)
Humidity	IEC 60068–2–78: Damp Heat: 90% RH (non-condensing at 40°C (104°F)).
Mechanical	Non-operating: IEC 60068–2–6: Vibration: 0.3 mm (10 to 58 Hz), 20 m/s^2 (58–500 Hz) IEC 60068–2–27: Shock: 1000 m/s^2 IEC 60068–2–29: Bump: 3000 bumps at 400 m/s^2
Enclosure	IEC 60529: Protection provided by enclosures: IP 50 with leather protection case.

Specifications – Sound Calibrator Type 4231

STANDARDS SATISFIED
EN/IEC 60942 (2003), Class LS and Class 1, Sound Calibrators
ANSI S1.40 – 2006, Specification for Acoustic Calibrators Class LS and Class 1

SOUND PRESSURE LEVELS
94.0 dB ±0.2 dB (Principal SPL) or
114.0 dB ±0.2 dB re 20 µPa at reference conditions

FREQUENCY
1 kHz ±0.1%

SPECIFIED MICROPHONE
Size according to IEC 61094-4:
- 1″ without adaptor
- 1/2″ with adaptor UC 0210 (supplied)
- 1/4″ with adaptor DP 0775 (optional)
- 1/8″ with adaptor DP 0774 (optional)

EQUIVALENT FREE-FIELD LEVEL
(0° incidence, re Nominal Sound Pressure Level)
–0.15 dB for 1/2″ Brüel & Kjær microphones. See the Type 4231 User Manual for other microphones

EQUIVALENT RANDOM INCIDENCE LEVEL
(re Nominal Sound Pressure Level)
+0.0 dB for 1″, 1/2″, 1/4″ and 1/8″ Brüel & Kjær microphones

NOMINAL EFFECTIVE COUPLER VOLUME
> 200 cm^3 at reference conditions

DISTORTION
< 1%

LEVEL STABILITY
Short-term: Better than 0.02 dB (as specified in IEC 60942)
One Year: Better than 0.05 dB (σ = 96%)
Stabilization Time: < 5 s

REFERENCE CONDITIONS
Temperature: 23°C ±3°C (73° ±5°F)
Pressure: 101 ±4 kPa
Humidity: 50%, –10% +15% RH
Effective Load Volume: 0.25 cm^3

ENVIRONMENTAL CONDITIONS
Pressure: 65 to 108 kPa
Humidity: 10 to 90% RH (non-condensing)
Effective Load Volume: 0 to 1.5 cm^3

INFLUENCE OF ENVIRONMENTAL CONDITIONS (Typical)
Temperature Coefficient: ±0.0015 dB/°C
Pressure Coefficient: $+8 \times 10^{-4}$ dB/kPa
Humidity Coefficient: 0.001 dB/% RH

POWER SUPPLY
Batteries: 2 × 1.5 V IEC Type LR6 (“AA” size)
Lifetime: Typically 200 hours continuous operation with alkaline batteries at 23°C (73°F)
Battery Check: When Type 4231 stops working continuously, and only operates when the On/Off button is held in, the batteries should be replaced

DIMENSIONS AND WEIGHT
(Without case)
Height: 40 mm (1.5″)
Width: 72 mm (2.8″)
Depth: 72 mm (2.8″)
Weight: 150 g (0.33 lb), including batteries

Note: All values are typical at 25°C (77°F), unless measurement uncertainty or tolerance field is specified. All uncertainty values are specified at 2σ (that is, expanded uncertainty using a coverage factor of 2)

Ordering Information

Type 4231 Sound Calibrator
includes the following accessories:
- KE-0317: Leather Case
- 2 × QB-0013: Alkaline Battery Type LR6
- UC-0210: Adaptor for 1/2″ microphones

Optional Accessories

DP-0775	Adaptor for 1/4″ microphones
DP-0774	Adaptor for 1/8″ microphones
DP-0887	Adaptor for Head and Torso Simulator Type 4128

BP 1311 – 17 2014 – 04

HEADQUARTERS: Brüel & Kjær Sound & Vibration Measurement A/S · DK-2850 Nærum · Denmark
Telephone: +45 7741 2000 · Fax: +45 4580 1405 · www.bksv.com · info@bksv.com

Local representatives and service organisations worldwide

Brüel & Kjær

Appendix E

Valid Calibration Certificates

輝創工程有限公司
Sun Creation Engineering Limited
Calibration & Testing Laboratory

Certificate of Calibration
校正證書

Certificate No. : C210389
證書編號

ITEM TESTED / 送檢項目 (Job No. / 序引編號 : IC21-0122) Date of Receipt / 收件日期 : 19 January 2021

Description / 儀器名稱	:	Sound Level Meter (EQ018)
Manufacturer / 製造商	:	Rion
Model No. / 型號	:	NL-52
Serial No. / 編號	:	00809405
Supplied By / 委託者	:	Action-United Environmental Services and Consulting Unit A, 20/F., Gold King Industrial Building, 35-41 Tai Lin Pai Road, Kwai Chung, N.T.

TEST CONDITIONS / 測試條件

Temperature / 溫度 : (23 ± 2)°C Relative Humidity / 相對濕度 : (50 ± 25)%
Line Voltage / 電壓 : ---

TEST SPECIFICATIONS / 測試規範

Calibration check

DATE OF TEST / 測試日期 : 20 January 2021

TEST RESULTS / 測試結果

The results apply to the particular unit-under-test only.
The results do not exceed manufacturer's specification.
The results are detailed in the subsequent page(s).

The test equipment used for calibration are traceable to National Standards via :
- The Government of The Hong Kong Special Administrative Region Standard & Calibration Laboratory
- The Bruel & Kjaer Calibration Laboratory, Denmark
- Agilent Technologies / Keysight Technologies
- Fluke Everett Service Center, USA

Tested By 測試 : Cheuk
K P Cheuk
Assistant Engineer

Certified By 核證 :
K C Lee
Engineer

Date of Issue 簽發日期 : 20 January 2021

Sun Creation Engineering Limited – Calibration & Testing Laboratory
c/o 4/F, 1 Hing On Lane, Tuen Mun, New Territories, Hong Kong
輝創工程有限公司 - 校正及檢測實驗所
c/o 香港新界屯門興安里一號四樓
Tel/電話: (852) 2927 2606 Fax/傳真: (852) 2744 8986 E-mail/電郵: callab@suncreation.com Website/網址: www.suncreation.com

Certificate of Calibration
校正證書

Certificate No. : C210389
證書編號

1. The unit-under-test (UUT) was allowed to stabilize in the laboratory for over 12 hours, and switched on to warm up for over 10 minutes before the commencement of the test.

2. Self-calibration was performed before the test.

3. The results presented are the mean of 3 measurements at each calibration point.

4. Test equipment :

Equipment ID	Description	Certificate No.
CL280	40 MHz Arbitrary Waveform Generator	C210084
CL281	Multifunction Acoustic Calibrator	CDK1806821

5. Test procedure : MA101N.

6. Results :

6.1 Sound Pressure Level

6.1.1 Reference Sound Pressure Level

UUT Setting				Applied Value		UUT Reading (dB)	IEC 61672 Class 1 Spec. (dB)
Range (dB)	Function	Frequency Weighting	Time Weighting	Level (dB)	Freq. (kHz)		
30 - 130	L_A	A	Fast	94.00	1	94.1	± 1.1

6.1.2 Linearity

UUT Setting				Applied Value		UUT Reading (dB)
Range (dB)	Function	Frequency Weighting	Time Weighting	Level (dB)	Freq. (kHz)	
30 - 130	L_A	A	Fast	94.00	1	94.1 (Ref.)
				104.00		104.1
				114.00		114.1

IEC 61672 Class 1 Spec. : ± 0.6 dB per 10 dB step and ± 1.1 dB for overall different.

6.2 Time Weighting

UUT Setting				Applied Value		UUT Reading (dB)	IEC 61672 Class 1 Spec. (dB)
Range (dB)	Function	Frequency Weighting	Time Weighting	Level (dB)	Freq. (kHz)		
30 - 130	L_A	A	Fast	94.00	1	94.1	Ref.
			Slow			94.1	± 0.3

Certificate of Calibration
校正證書

Certificate No. : C210389
證書編號

6.3 Frequency Weighting

6.3.1 A-Weighting

UUT Setting				Applied Value		UUT Reading (dB)	IEC 61672 Class 1 Spec. (dB)
Range (dB)	Function	Frequency Weighting	Time Weighting	Level (dB)	Freq.		
30 - 130	L_A	A	Fast	94.00	63 Hz	67.8	-26.2 ± 1.5
					125 Hz	77.9	-16.1 ± 1.5
					250 Hz	85.4	-8.6 ± 1.4
					500 Hz	90.9	-3.2 ± 1.4
					1 kHz	94.1	Ref.
					2 kHz	95.3	+1.2 ± 1.6
					4 kHz	95.1	+1.0 ± 1.6
					8 kHz	93.1	-1.1 (+2.1 ; -3.1)
					12.5 kHz	89.7	-4.3 (+3.0 ; -6.0)

6.3.2 C-Weighting

UUT Setting				Applied Value		UUT Reading (dB)	IEC 61672 Class 1 Spec. (dB)
Range (dB)	Function	Frequency Weighting	Time Weighting	Level (dB)	Freq.		
30 - 130	L_C	C	Fast	94.00	63 Hz	93.3	-0.8 ± 1.5
					125 Hz	93.9	-0.2 ± 1.5
					250 Hz	94.1	0.0 ± 1.4
					500 Hz	94.1	0.0 ± 1.4
					1 kHz	94.1	Ref.
					2 kHz	93.9	-0.2 ± 1.6
					4 kHz	93.3	-0.8 ± 1.6
					8 kHz	91.2	-3.0 (+2.1 ; -3.1)
					12.5 kHz	87.7	-6.2 (+3.0 ; -6.0)

Sun Creation Engineering Limited – Calibration & Testing Laboratory
c/o 4/F, 1 Hing On Lane, Tuen Mun, New Territories, Hong Kong
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Certificate of Calibration
校正證書

Certificate No. : C210389
證書編號

Remarks : - UUT Microphone Model No. : UC-59 & S/N : 16463

- Mfr's Spec. : IEC 61672 Class 1

- Uncertainties of Applied Value :

94 dB	: 63 Hz - 125 Hz	: ± 0.35 dB
	250 Hz - 500 Hz	: ± 0.30 dB
	1 kHz	: ± 0.20 dB
	2 kHz - 4 kHz	: ± 0.35 dB
	8 kHz	: ± 0.45 dB
	12.5 kHz	: ± 0.70 dB
104 dB	: 1 kHz	: ± 0.10 dB (Ref. 94 dB)
114 dB	: 1 kHz	: ± 0.10 dB (Ref. 94 dB)

- The uncertainties are for a confidence probability of not less than 95 %.

Note :
Only the original copy or the laboratory's certified true copy is valid.

The values given in this Certificate only relate to the values measured at the time of the test and any uncertainties quoted will not include allowance for the equipment long term drift, variations with environment changes, vibration and shock during transportation, overloading, mis-handling, or the capability of any other laboratory to repeat the measurement. Sun Creation Engineering Limited shall not be liable for any loss or damage resulting from the use of the equipment.

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Certificate of Calibration
校正證書

Certificate No. : C214363
證書編號

ITEM TESTED / 送檢項目 (Job No. / 序引編號 : IC21-1345) Date of Receipt / 收件日期 : 8 July 2021

Description / 儀器名稱 : Integrating Sound Level Meter (EQ010)
Manufacturer / 製造商 : Brüel & Kjær
Model No. / 型號 : 2238
Serial No. / 編號 : 2285721
Supplied By / 委託者 : Action-United Environmental Services and Consulting
Unit A, 20/F., Gold King Industrial Building,
35-41 Tai Lin Pai Road, Kwai Chung, N.T.

TEST CONDITIONS / 測試條件

Temperature / 溫度 : (23 ± 2)°C Relative Humidity / 相對濕度 : (50 ± 25)%
Line Voltage / 電壓 : ---

TEST SPECIFICATIONS / 測試規範

Calibration check

DATE OF TEST / 測試日期 : 24 July 2021

TEST RESULTS / 測試結果

The results apply to the particular unit-under-test only.
The results do not exceed manufacturer's specification.
The results are detailed in the subsequent page(s).

The test equipment used for calibration are traceable to National Standards via :
- The Government of The Hong Kong Special Administrative Region Standard & Calibration Laboratory
- Agilent Technologies / Keysight Technologies
- Fluke Everett Service Center, USA

Tested By 測試 : Cheuk
K P Cheuk
Project Engineer

Certified By 核證 : K C Lee
Engineer

Date of Issue 簽發日期 : 26 July 2021

Sun Creation Engineering Limited – Calibration & Testing Laboratory
c/o 4/F, 1 Hing On Lane, Tuen Mun, New Territories, Hong Kong
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Certificate of Calibration
校正證書

Certificate No. : C214363
證書編號

1. The unit-under-test (UUT) was allowed to stabilize in the laboratory for over 12 hours, and switched on to warm up for over 10 minutes before the commencement of the test.

2. Self-calibration using laboratory acoustic calibrator was performed before the test from 6.1.1.2 to 6.4.

3. The results presented are the mean of 3 measurements at each calibration point.

4. Test equipment :

Equipment ID	Description	Certificate No.
CL280	40 MHz Arbitrary Waveform Generator	C210084
CL281	Multifunction Acoustic Calibrator	AV210017

5. Test procedure : MA101N.

6. Results :

6.1 Sound Pressure Level

6.1.1 Reference Sound Pressure Level

6.1.1.1 Before Self-calibration

UUT Setting				Applied Value		UUT Reading (dB)
Range (dB)	Parameter	Frequency Weighting	Time Weighting	Level (dB)	Freq. (kHz)	
50 - 130	L_{AFP}	A	F	94.00	1	94.1

6.1.1.2 After Self-calibration

UUT Setting				Applied Value		UUT Reading (dB)	IEC 60651 Type 1 Spec. (dB)
Range (dB)	Parameter	Frequency Weighting	Time Weighting	Level (dB)	Freq. (kHz)		
50 - 130	L_{AFP}	A	F	94.00	1	94.0	± 0.7

6.1.2 Linearity

UUT Setting				Applied Value		UUT Reading (dB)
Range (dB)	Parameter	Frequency Weighting	Time Weighting	Level (dB)	Freq. (kHz)	
50 - 130	L_{AFP}	A	F	94.00	1	94.0 (Ref.)
				104.00		104.0
				114.00		113.9

IEC 60651 Type 1 Spec. : ± 0.4 dB per 10 dB step and ± 0.7 dB for overall different.

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Certificate of Calibration
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Certificate No. : C214363
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6.2 Time Weighting

6.2.1 Continuous Signal

UUT Setting				Applied Value		UUT Reading (dB)	IEC 60651 Type 1 Spec. (dB)
Range (dB)	Parameter	Frequency Weighting	Time Weighting	Level (dB)	Freq. (kHz)		
50 - 130	L_{AFP}	A	F	94.00	1	94.0	Ref.
	L_{ASP}		S			94.0	± 0.1
	L_{AIP}		I			94.0	± 0.1

6.2.2 Tone Burst Signal (2 kHz)

UUT Setting				Applied Value		UUT Reading (dB)	IEC 60651 Type 1 Spec. (dB)
Range (dB)	Parameter	Frequency Weighting	Time Weighting	Level (dB)	Burst Duration		
30 - 110	L_{AFP}	A	F	106.0	Continuous	106.0	Ref.
	L_{AFMax}				200 ms	105.1	-1.0 ± 1.0
	L_{ASP}		S		Continuous	106.0	Ref.
	L_{ASMax}				500 ms	102.1	-4.1 ± 1.0

6.3 Frequency Weighting

6.3.1 A-Weighting

UUT Setting				Applied Value		UUT Reading (dB)	IEC 60651 Type 1 Spec. (dB)
Range (dB)	Parameter	Frequency Weighting	Time Weighting	Level (dB)	Freq.		
50 - 130	L_{AFP}	A	F	94.00	31.5 Hz	54.7	-39.4 ± 1.5
					63 Hz	67.8	-26.2 ± 1.5
					125 Hz	77.8	-16.1 ± 1.0
					250 Hz	85.3	-8.6 ± 1.0
					500 Hz	90.7	-3.2 ± 1.0
					1 kHz	94.0	Ref.
					2 kHz	95.2	+1.2 ± 1.0
					4 kHz	95.0	+1.0 ± 1.0
					8 kHz	92.8	-1.1 (+1.5 ; -3.0)
					12.5 kHz	89.7	-4.3 (+3.0 ; -6.0)

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c/o 4/F, 1 Hing On Lane, Tuen Mun, New Territories, Hong Kong
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Certificate of Calibration
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Certificate No. : C214363
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6.3.2 C-Weighting

UUT Setting				Applied Value		UUT Reading (dB)	IEC 60651 Type 1 Spec. (dB)
Range (dB)	Parameter	Frequency Weighting	Time Weighting	Level (dB)	Freq.		
50 - 130	L_{CFP}	C	F	94.00	31.5 Hz	91.1	-3.0 ± 1.5
					63 Hz	93.2	-0.8 ± 1.5
					125 Hz	93.8	-0.2 ± 1.0
					250 Hz	94.0	0.0 ± 1.0
					500 Hz	94.0	0.0 ± 1.0
					1 kHz	94.0	Ref.
					2 kHz	93.8	-0.2 ± 1.0
					4 kHz	93.2	-0.8 ± 1.0
					8 kHz	90.9	-3.0 (+1.5 ; -3.0)
					12.5 kHz	87.8	-6.2 (+3.0 ; -6.0)

6.4 Time Averaging

UUT Setting				Applied Value					UUT Reading (dB)	IEC 60804 Type 1 Spec. (dB)
Range (dB)	Parameter	Frequency Weighting	Integrating Time	Frequency (kHz)	Burst Duration (ms)	Burst Duty Factor	Burst Level (dB)	Equivalent Level (dB)		
30 - 110	L_{Aeq}	A	10 sec.	4	1	1/10	110.0	100	100.0	± 0.5
						$1/10^2$		90	90.2	± 0.5
			60 sec.			$1/10^3$		80	79.9	± 1.0
			5 min.			$1/10^4$		70	69.8	± 1.0

Remarks : - UUT Microphone Model No. : 4188 & S/N : 2658547

- Mfr's Spec. : IEC 60651 Type 1 & IEC 60804 Type 1

- Uncertainties of Applied Value :

94 dB	: 31.5 Hz - 125 Hz	: ± 0.35 dB
	250 Hz - 500 Hz	: ± 0.30 dB
	1 kHz	: ± 0.20 dB
	2 kHz - 4 kHz	: ± 0.35 dB
	8 kHz	: ± 0.45 dB
	12.5 kHz	: ± 0.70 dB
104 dB	: 1 kHz	: ± 0.10 dB (Ref. 94 dB)
114 dB	: 1 kHz	: ± 0.10 dB (Ref. 94 dB)
Burst equivalent level		: ± 0.2 dB (Ref. 110 dB continuous sound level)

- The uncertainties are for a confidence probability of not less than 95 %.

Note :
Only the original copy or the laboratory's certified true copy is valid.

The values given in this Certificate only relate to the values measured at the time of the test and any uncertainties quoted will not include allowance for the equipment long term drift, variations with environment changes, vibration and shock during transportation, overloading, mis-handling, or the capability of any other laboratory to repeat the measurement. Sun Creation Engineering Limited shall not be liable for any loss or damage resulting from the use of the equipment.

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Sun Creation Engineering Limited
Calibration & Testing Laboratory

Certificate of Calibration
校正證書

Certificate No. : C215418
證書編號

ITEM TESTED / 送檢項目 (Job No. / 序引編號 : IC21-1345) Date of Receipt / 收件日期 : 26 August 2021

Description / 儀器名稱 : Sound Calibrator (EQ083)
Manufacturer / 製造商 : Rion
Model No. / 型號 : NC-74
Serial No. / 編號 : 34246492
Supplied By / 委託者 : Action-United Environmental Services and Consulting
Unit A, 20/F., Gold King Industrial Building,
35-41 Tai Lin Pai Road, Kwai Chung, N.T.

TEST CONDITIONS / 測試條件

Temperature / 溫度 : (23 ± 2)°C Relative Humidity / 相對濕度 : (50 ± 25)%
Line Voltage / 電壓 : ---

TEST SPECIFICATIONS / 測試規範

Calibration check

DATE OF TEST / 測試日期 : 10 September 2021

TEST RESULTS / 測試結果

The results apply to the particular unit-under-test only.
The results do not exceed manufacturer's specification.
The results are detailed in the subsequent page(s).

The test equipment used for calibration are traceable to National Standards via :
- The Government of The Hong Kong Special Administrative Region Standard & Calibration Laboratory
- Agilent Technologies / Keysight Technologies
- Fluke Everett Service Center, USA

Tested By 測試 : K P Cheuk
Project Engineer

Certified By 核證 : K C Lee
Engineer

Date of Issue 簽發日期 : 13 September 2021

Sun Creation Engineering Limited – Calibration & Testing Laboratory
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Calibration & Testing Laboratory

Certificate of Calibration
校正證書

Certificate No. : C215418
證書編號

1. The unit-under-test (UUT) was allowed to stabilize in the laboratory for over 12 hours before the commencement of the test.

2. The results presented are the mean of 3 measurements at each calibration point.

3. Test equipment :

Equipment ID	Description	Certificate No.
CL130	Universal Counter	C213954
CL281	Multifunction Acoustic Calibrator	AV210017
TST150A	Measuring Amplifier	C201309

4. Test procedure : MA100N.

5. Results :

5.1 Sound Level Accuracy

UUT Nominal Value	Measured Value (dB)	Mfr's Spec. (dB)	Uncertainty of Measured Value (dB)
94 dB, 1 kHz	94.0	± 0.3	± 0.2

5.2 Frequency Accuracy

UUT Nominal Value (kHz)	Measured Value (kHz)	Mfr's Spec.	Uncertainty of Measured Value (Hz)
1	1.002	1 kHz ± 1 %	± 1

Remark : The uncertainties are for a confidence probability of not less than 95 %.

Note :
Only the original copy or the laboratory's certified true copy is valid.

The values given in this Certificate only relate to the values measured at the time of the test and any uncertainties quoted will not include allowance for the equipment long term drift, variations with environment changes, vibration and shock during transportation, overloading, mis-handling, or the capability of any other laboratory to repeat the measurement. Sun Creation Engineering Limited shall not be liable for any loss or damage resulting from the use of the equipment.

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Certificate of Calibration
校正證書

Certificate No. : C214361
證書編號

ITEM TESTED / 送檢項目 (Job No. / 序引編號 : IC21-1345) Date of Receipt / 收件日期 : 8 July 2021

Description / 儀器名稱 : Sound Calibrator (EQ082)
Manufacturer / 製造商 : Brüel & Kjær
Model No. / 型號 : 4231
Serial No. / 編號 : 2713428
Supplied By / 委託者 : Action-United Environmental Services and Consulting
Unit A, 20/F., Gold King Industrial Building,
35-41 Tai Lin Pai Road, Kwai Chung, N.T.

TEST CONDITIONS / 測試條件

Temperature / 溫度 : (23 ± 2)°C Relative Humidity / 相對濕度 : (50 ± 25)%
Line Voltage / 電壓 : ---

TEST SPECIFICATIONS / 測試規範

Calibration check

DATE OF TEST / 測試日期 : 24 July 2021

TEST RESULTS / 測試結果

The results apply to the particular unit-under-test only.
The results do not exceed manufacturer's specification.
The results are detailed in the subsequent page(s).

The test equipment used for calibration are traceable to National Standards via :
- The Government of The Hong Kong Special Administrative Region Standard & Calibration Laboratory
- Agilent Technologies / Keysight Technologies
- Fluke Everett Service Center, USA

Tested By 測試 : K P Cheuk
Project Engineer

Certified By 核證 : K C Lee
Engineer

Date of Issue 簽發日期 : 26 July 2021

Sun Creation Engineering Limited – Calibration & Testing Laboratory
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Certificate of Calibration
校正證書

Certificate No. : C214361
證書編號

1. The unit-under-test (UUT) was allowed to stabilize in the laboratory for over 12 hours before the commencement of the test.

2. The results presented are the mean of 3 measurements at each calibration point.

3. Test equipment :

Equipment ID	Description	Certificate No.
CL130	Universal Counter	C213954
CL281	Multifunction Acoustic Calibrator	AV210017
TST150A	Measuring Amplifier	C201309

4. Test procedure : MA100N.

5. Results :

5.1 Sound Level Accuracy

UUT Nominal Value	Measured Value (dB)	Mfr's Spec. (dB)	Uncertainty of Measured Value (dB)
94 dB, 1 kHz	94.0	± 0.2	± 0.2
114 dB, 1 kHz	114.1		

5.2 Frequency Accuracy

UUT Nominal Value (kHz)	Measured Value (kHz)	Mfr's Spec.	Uncertainty of Measured Value (Hz)
1	1.000 0	1 kHz ± 0.1 %	± 0.1

Remark : The uncertainties are for a confidence probability of not less than 95 %.

Note :
Only the original copy or the laboratory's certified true copy is valid.

The values given in this Certificate only relate to the values measured at the time of the test and any uncertainties quoted will not include allowance for the equipment long term drift, variations with environment changes, vibration and shock during transportation, overloading, mis-handling, or the capability of any other laboratory to repeat the measurement. Sun Creation Engineering Limited shall not be liable for any loss or damage resulting from the use of the equipment.

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Appendix F

Database for Noise Measurement Data

Baseline Noise Monitoring results at NMS-5 (Day Time)																				
Date	Start Time	1st Leq (5min)			2nd Leq (5min)			3rd Leq (5min)			4th Leq (5min)			5th Leq (5min)			6th Leq (5min)			Leq30min, dB(A)	Corrected Noise Level
		Leq, dB(A)	L10, dB(A)	L90, dB(A)	Leq, dB(A)	L10, dB(A)	L90, dB(A)	Leq, dB(A)	L10, dB(A)	L90, dB(A)	Leq, dB(A)	L10, dB(A)	L90, dB(A)	Leq, dB(A)	L10, dB(A)	L90, dB(A)	Leq, dB(A)	L10, dB(A)	L90, dB(A)		
4-Nov-21	9:26	52.6	53.2	46.5	54.8	52.9	46.3	49.2	52.1	45.8	49.8	52.4	46.2	53.4	56.2	47.3	50.8	53.5	46.2	52.2	55.2
5-Nov-21	9:19	50.4	52.4	47.9	51.1	52.3	47.7	50.7	53.2	48.1	49.6	51.0	48.0	51.5	52.8	47.0	49.0	50.8	47.2	50.5	53.5
6-Nov-21	9:38	50.1	52.8	44.8	50.3	52.5	45.1	54.4	54.8	45.3	49.7	52.6	44.9	49.8	52.3	44.6	48.2	50.9	45.4	50.9	53.9
7-Nov-21	13:44	56.6	53.8	44.8	57.9	53.9	45.3	54.8	54.5	44.5	49.3	51.7	44.5	53.6	53.7	45.2	50.2	51.9	44.8	54.8	57.8
8-Nov-21	15:34	50.1	51.7	46.9	50.2	52.9	47.0	52.5	56.3	47.5	49.9	51.4	47.2	50.6	53.4	48.1	50.9	53.3	47.4	50.8	53.8
9-Nov-21	10:14	48.5	50.4	45.9	50.2	51.7	46.0	49.3	52.2	45.3	49.8	51.1	45.7	49.7	51.9	45.8	50.3	52.7	46.3	49.7	52.7
10-Nov-21	11:16	49.7	51.4	46.0	48.2	49.9	45.9	49.8	50.9	45.6	49.4	52.3	45.6	48.7	52.0	44.9	50.7	51.7	45.7	49.5	52.5
11-Nov-21	16:23	51.0	53.7	47.4	50.2	52.3	47.4	49.1	50.6	47.2	53.8	55.7	48.6	55.9	58.6	51.8	53.0	55.0	47.5	52.8	55.8
12-Nov-21	9:30	52.6	54.5	49.0	52.4	54.0	46.0	50.3	52.5	45.5	49.1	53.0	44.5	55.1	54.0	44.5	48.8	52.0	44.5	52.0	55.0
13-Nov-21	13:31	49.4	52.9	45.9	51.0	53.6	45.7	49.1	49.8	45.4	51.3	53.5	45.8	48.5	50.7	45.3	49.9	53.0	45.8	50.0	53.0
14-Nov-21	14:23	49.3	52.2	45.0	49.1	51.5	44.3	50.2	53.0	45.4	48.5	51.5	44.3	49.5	52.9	45.8	49.5	52.1	45.1	49.4	52.4
15-Nov-21	9:29	59.0	62.5	47.0	53.7	57.0	48.0	57.8	61.5	48.5	51.6	53.5	4.0	50.3	50.5	45.5	50.6	53.0	47.0	55.2	58.2
16-Nov-21	9:02	62.3	55.9	46.6	49.1	50.9	45.8	48.2	51.3	45.0	53.2	52.4	45.2	51.5	54.5	46.0	50.6	52.9	47.0	55.9	58.9
17-Nov-21	9:55	51.3	53.3	48.4	54.1	58.0	47.8	50.5	52.4	47.4	50.1	52.5	47.7	49.4	51.6	46.7	50.5	53.3	47.0	51.3	54.3

Public Holiday	

Appendix G

Meteorological Data during Baseline Monitoring Period (Extracted from Hong Kong Observatory)

Meteorological Data during Baseline Monitoring

Date		Weather	Total Rainfall (mm)	Ta Kwu Ling Station			
				Mean Air Temp. (°C)	Wind Speed (km/h)	Wind Direction	Mean Relative Humidity (%)
4-Nov-21	Thu	Mainly fine and rather warm tomorrow	0	26.3	7.5	75.5	E/SE
5-Nov-21	Fri	Light to moderate easterly winds.	0	26.5	8	77.7	E
6-Nov-21	Sat	Mainly fine in the afternoon.	0	26	10.5	75	E/SE
7-Nov-21	Sun	Moderate northerly winds	0	25.1	9.2	78.2	E/SE
8-Nov-21	Mon	Mainly fine and dry.	2	19.3	13.7	67.0	N/NE
9-Nov-21	Tue	Mainly fine and very dry.	0	18.2	13.3	69.7	N
10-Nov-21	Wed	Mainly fine and very dry	0	18.3	12	48.5	N/NE
11-Nov-21	Thu	Mainly fine and rather warm tomorrow	0	17.9	6	59.5	S/SE
12-Nov-21	Fri	Light to moderate easterly winds.	0	20.2	7	59	N
13-Nov-21	Sat	Mainly fine in the afternoon.	Trace	19.6	6	57	E/SE
14-Nov-21	Sun	Mainly fine and dry.	0	18.9	5.5	63	E/SE
15-Nov-21	Mon	Moderate east to northeasterly winds.	0	19.8	7	66	E/SE
16-Nov-21	Tue	Mainly cloudy tonight.	0	21.3	5.5	71.5	N
17-Nov-21	Wed	Sunny intervals in the afternoon.	0	22	7	77	E