

Annex E1

# Calibration Certificates for Noise Monitoring Equipment

# Certificate of Calibration

## 校正證書

Certificate No. : C232965

證書編號

ITEM TESTED / 送檢項目 (Job No. / 序引編號 : IC23-0878)

Date of Receipt / 收件日期 : 4 May 2023

Description / 儀器名稱 : Sound Level Meter

Manufacturer / 製造商 : Rion

Model No. / 型號 : NL-52

Serial No. / 編號 : 00643049

Supplied By / 委託者 : Envirotech Services Co.

Room 712, 7/F, My Loft, 9 Hoi Wing Road, Tuen Mun,  
New Territories, Hong Kong

### TEST CONDITIONS / 測試條件

Temperature / 溫度 :  $(23 \pm 2)^{\circ}\text{C}$

Relative Humidity / 相對濕度 :  $(50 \pm 25)\%$

Line Voltage / 電壓 : ---

### TEST SPECIFICATIONS / 測試規範

Calibration

DATE OF TEST / 測試日期 : 27 May 2023

### TEST RESULTS / 測試結果

The results apply to the particular unit-under-test only.

The results do not exceed specified limits. (after adjustment)

These limits refer to manufacturer's published tolerances as requested by the customer.

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
- Hottinger Bruel & Kjaer Calibration Laboratory, Denmark
- Agilent Technologies / Keysight Technologies
- Fluke Everett Service Center, USA

Tested By


測試



H T Wong  
Assistant Engineer

Certified By

核證

  
K C Lee  
Engineer

Date of Issue

簽發日期

29 May 2023

The test equipment used for calibration is traceable to the National Standards as specified in this certificate. This certificate shall not be reproduced except in full, without the prior written approval of this laboratory.

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- 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.
- Self-calibration using the internal standard (After Adjustment) was performed before the test 6.1.1.2 to 6.3.2.
- The results presented are the mean of 3 measurements at each calibration point.
- Test equipment :

| Equipment ID | Description                         | Certificate No. |
|--------------|-------------------------------------|-----------------|
| CL280        | 40 MHz Arbitrary Waveform Generator | C230306         |
| CL281        | Multifunction Acoustic Calibrator   | CDK2302738      |

5. Test procedure : MA101N.

6. Results :

6.1 Sound Pressure Level

6.1.1 Reference Sound Pressure Level

6.1.1.1 Before Adjustment

| UUT Setting |                |                     |                | Applied Value |             | UUT Reading (dB) | IEC 61672 Class 1 Limit (dB) |
|-------------|----------------|---------------------|----------------|---------------|-------------|------------------|------------------------------|
| Range (dB)  | Function       | Frequency Weighting | Time Weighting | Level (dB)    | Freq. (kHz) |                  |                              |
| 30 - 130    | L <sub>A</sub> | A                   | Fast           | 94.00         | 1           | * 95.5           | ± 1.1                        |

\* Out of IEC 61672 Class 1 Limit

6.1.1.2 After Adjustment

| UUT Setting |                |                     |                | Applied Value |             | UUT Reading (dB) | IEC 61672 Class 1 Limit (dB) |
|-------------|----------------|---------------------|----------------|---------------|-------------|------------------|------------------------------|
| Range (dB)  | Function       | Frequency Weighting | Time Weighting | Level (dB)    | Freq. (kHz) |                  |                              |
| 30 - 130    | L <sub>A</sub> | A                   | Fast           | 94.00         | 1           | 94.0             | ± 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 <sub>A</sub> | A                   | Fast           | 94.00         | 1           | 94.0 (Ref.)      |
|             |                |                     |                | 104.00        |             | 104.0            |
|             |                |                     |                | 114.00        |             | 114.1            |

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

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# Certificate of Calibration

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### 6.2 Time Weighting

| UUT Setting |                |                     |                | Applied Value |             | UUT Reading (dB) | IEC 61672 Class 1 Limit (dB) |
|-------------|----------------|---------------------|----------------|---------------|-------------|------------------|------------------------------|
| Range (dB)  | Function       | Frequency Weighting | Time Weighting | Level (dB)    | Freq. (kHz) |                  |                              |
| 30 - 130    | L <sub>A</sub> | A                   | Fast           | 94.00         | 1           | 94.0             | Ref.                         |
|             |                |                     | Slow           |               |             |                  |                              |

### 6.3 Frequency Weighting

#### 6.3.1 A-Weighting

| UUT Setting |                |                     |                | Applied Value |        | UUT Reading (dB) | IEC 61672 Class 1 Limit (dB) |
|-------------|----------------|---------------------|----------------|---------------|--------|------------------|------------------------------|
| Range (dB)  | Function       | Frequency Weighting | Time Weighting | Level (dB)    | Freq.  |                  |                              |
| 30 - 130    | L <sub>A</sub> | A                   | Fast           | 94.00         | 63 Hz  | 67.7             | -26.2 ± 1.5                  |
|             |                |                     |                |               | 125 Hz | 77.8             | -16.1 ± 1.5                  |
|             |                |                     |                |               | 250 Hz | 85.3             | -8.6 ± 1.4                   |
|             |                |                     |                |               | 500 Hz | 90.8             | -3.2 ± 1.4                   |
|             |                |                     |                |               | 1 kHz  | 94.0             | Ref.                         |
|             |                |                     |                |               | 2 kHz  | 95.2             | +1.2 ± 1.6                   |
|             |                |                     |                |               | 4 kHz  | 95.0             | +1.0 ± 1.6                   |
|             |                |                     |                |               | 8 kHz  | 92.9             | -1.1 (+2.1 ; -3.1)           |
|             |                |                     |                |               | 16 kHz | 86.0             | -6.6 (+3.5 ; -17.0)          |

#### 6.3.2 C-Weighting

| UUT Setting |                |                     |                | Applied Value |        | UUT Reading (dB) | IEC 61672 Class 1 Limit (dB) |
|-------------|----------------|---------------------|----------------|---------------|--------|------------------|------------------------------|
| Range (dB)  | Function       | Frequency Weighting | Time Weighting | Level (dB)    | Freq.  |                  |                              |
| 30 - 130    | L <sub>C</sub> | C                   | Fast           | 94.00         | 63 Hz  | 93.1             | -0.8 ± 1.5                   |
|             |                |                     |                |               | 125 Hz | 93.8             | -0.2 ± 1.5                   |
|             |                |                     |                |               | 250 Hz | 94.0             | 0.0 ± 1.4                    |
|             |                |                     |                |               | 500 Hz | 94.0             | 0.0 ± 1.4                    |
|             |                |                     |                |               | 1 kHz  | 94.0             | Ref.                         |
|             |                |                     |                |               | 2 kHz  | 93.8             | -0.2 ± 1.6                   |
|             |                |                     |                |               | 4 kHz  | 93.2             | -0.8 ± 1.6                   |
|             |                |                     |                |               | 8 kHz  | 91.0             | -3.0 (+2.1 ; -3.1)           |
|             |                |                     |                |               | 16 kHz | 84.1             | -8.5 (+3.5 ; -17.0)          |

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# Certificate of Calibration

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- Remarks : - UUT Microphone Model No. : UC-59 & S/N : 12128
- Mfr's Limit : 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              |
|        | 16 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. : C227323  
證書編號

ITEM TESTED / 送檢項目 (Job No. / 序引編號 : IC22-2398) Date of Receipt / 收件日期 : 24 November 2022

Description / 儀器名稱 : Precision Acoustic Calibrator  
Manufacturer / 製造商 : LARSON DAVIS  
Model No. / 型號 : CAL200  
Serial No. / 編號 : 15678  
Supplied By / 委託者 : Envirotech Services Co.  
Room 712, 7/F, My Loft, 9 Hoi Wing Road, Tuen Mun,  
New Territories, Hong Kong

## TEST CONDITIONS / 測試條件

Temperature / 溫度 :  $(23 \pm 2)^{\circ}\text{C}$  Relative Humidity / 相對濕度 :  $(50 \pm 25)\%$   
Line Voltage / 電壓 : ---

## TEST SPECIFICATIONS / 測試規範

Calibration check

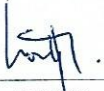
DATE OF TEST / 測試日期 : 18 December 2022

## 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 : \_\_\_\_\_  
H T Wong  
Assistant Engineer

Certified By :   
核證 : \_\_\_\_\_  
K C Lee  
Engineer

Date of Issue : 19 December 2022  
簽發日期

The test equipment used for calibration is traceable to the National Standards as specified in this certificate. This certificate shall not be reproduced except in full, without the prior written approval of this laboratory.  
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# Certificate of Calibration

## 校正證書

Certificate No. : C227323  
證書編號

- The unit-under-test (UUT) was allowed to stabilize in the laboratory for over 12 hours before the commencement of the test.
- The results presented are the mean of 3 measurements at each calibration point.
- Test equipment :

| <u>Equipment ID</u> | <u>Description</u>                | <u>Certificate No.</u> |
|---------------------|-----------------------------------|------------------------|
| CL130               | Universal Counter                 | C223647                |
| CL281               | Multifunction Acoustic Calibrator | AV210017               |
| TST150A             | Measuring Amplifier               | C221750                |

- Test procedure : MA100N.
- Results :

### 5.1 Sound Level Accuracy

| UUT<br>Nominal Value | Measured Value<br>(dB) | Mfr's Spec.<br>(dB) | Uncertainty of Measured Value<br>(dB) |
|----------------------|------------------------|---------------------|---------------------------------------|
| 94 dB, 1 kHz         | 93.9                   | ± 0.2               | ± 0.2                                 |
| 114 dB, 1 kHz        | 113.9                  |                     |                                       |

### 5.2 Frequency Accuracy

| UUT Nominal Value<br>(kHz) | Measured Value<br>(kHz) | Mfr's<br>Spec. | Uncertainty of Measured Value<br>(Hz) |
|----------------------------|-------------------------|----------------|---------------------------------------|
| 1                          | 1.000                   | 1 kHz ± 1 %    | ± 1                                   |

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

#### Note :

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