

Appendix E

Noise Monitoring Equipment Calibration

Certificate

CERTIFICATE OF CALIBRATION

NO. 20200519037

Name of Product:	Sound Level Meter
Model:	ST-11D
Serial Number:	820197
Specification:	Class 1
Conclusion:	Pass
Date of calibration:	2020-12-31
Due Date:	2021-12-30



Calibrated by:

- I. This report certifies that all calibration equipment used in the test is traceable with the internal ISO9001 procedures and meets all specification given in the Manual(s) or respectively surpass then, and applies only to the unit identified above.
- II. This certificate is produced with advanced equipment & procedures which permit comprehensive quality assurance verification of all data supplied herein.
- III. This certificate of calibration shall not be reproduced except in full, without written permission of the Scarlet Tech Co Ltd Taiwan.

1. Preliminary inspection: OK

4. Measuring up limit: 140 dBA

2. Type & serial No. of Microphone: AWA14425-35373

5. Frequency weightings (Acoustic signal tests for Z weighting, other electric signal tests.)

3. Adjustments to indicated sound levels:

Type of Calibrator B&K 4231

Sound Pressure Level 94.0 dB

Equivalent Free-field Sound Level (reference environment conditions) 93.8 dB

Nominal frequency /Hz	Frequency weighting / dB			Nominal frequency /Hz	Frequency weighting / dB		
	A	C	Z		A	C	Z
10	-71.2	-14.4	-0.7	1000	0.0	-0.1	0.0
20	-50.2	-6.1	0.0	2000	1.2	-0.2	0.5
31.5	-39.5	-3.0	0.1	4000	1.0	-0.9	0.4
63	-26.3	-0.9	0.5	8000	-1.0	-3.2	-0.4
125	-16.0	-0.3	0.1	12500	-5.9	-7.9	-1.5
250	-8.6	-0.1	0.3	16000	-11.8	-13.8	-0.8
500	-3.2	-0.1	0.2	20000	-23.9	-25.9	0.1

6. Self-generated noise

Microphone replaced by electrical input signal device

9.4 dB(A)	15.6 dB(C)	19.5 dB(Z)
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7. F&S Weighting

Rate of the F weighting decrease (dB/s)	35.2
Rate of the S weighting decrease (dB/s)	4.4
Deviation of F&S	0.0

8. Level Linearity (A-weighting at frequency 1 kHz)

Reference sound level 90.0 dB

Max error at 10dB steps upper reference sound level -0.1 dB

Max error at 1dB steps within 5dB of the upper limit linear operating range 0.0 dB

Max error at 10dB steps below reference sound level 0.1 dB

Max error at 1dB steps within 5dB upper the lower limit linear operating range 0.2 dB

9. Tone burst response (A Weighting) :

Single Toneburst duration /ms	Toneburst response /dB			
	L _A F _{max} -L _A	L _A S _{max} -L _A	L _A E-L _A	L _A eqT-L _A
500	0.0	-4.0	-2.9	-7.0
200	-1.0	-7.4	-6.9	-7.0
50	-18.0	-26.9	-26.9	-7.0
10	-27.2	/	-36.0	-7.0

10. Peak C sound level (500Hz) :

Cycle	One cycle	nominal value	Positive half	nominal value	Negative half	nominal value
L _C peak-L _C (dB)	3.5	3.5	2.3	2.4	2.3	2.4

11. Overload indication: Pass

12. Statistical analysis function

Sweep signal maximum indicated sound level: 112.8 dB

Sweep amplitude: 40 dB

Scan cycle time: 60 S; Measurement period: 180 S.

Items	Measured value/dB	Theoretical calculated value/dB	Error/dB
L _A eq,T	103.2	103.2	0.0

L5	110.8	110.8	0.0
L10	108.8	108.8	0.0
L50	92.9	92.8	0.1
L90	76.9	76.8	0.1
L95	75.0	74.8	0.2

Uncertainty of measurement results: 0.4 dB (k=2)

Environment conditions:

Air temperature: 25 °C

Relative humidity: 50 %

Static pressure: 100.6 kPa

References:

IEC 61672-3 Sound Level Meters Part 3: Periodic tests



CERTIFICATE OF CALIBRATION

NO. 20200519040

Name of Product:	Sound Level Meter
Model:	ST-11D
Serial Number:	820200
Specification:	Class 1
Conclusion:	Pass
Date of calibration:	2021-01-18
Due Date:	2022-01-17



Calibrated by:

- I. This report certifies that all calibration equipment used in the test is traceable with the internal ISO9001 procedures and meets all specification given in the Manual(s) or respectively surpass then, and applies only to the unit identified above.
- II. This certificate is produced with advanced equipment & procedures which permit comprehensive quality assurance verification of all data supplied herein.
- III. This certificate of calibration shall not be reproduced except in full, without written permission of the Scarlet Tech Co Ltd Taiwan.

1. Preliminary inspection: OK

4. Measuring up limit: 140 dBA

2. Type & serial No. of Microphone: AWA14425-27998

5. Frequency weightings (Acoustic signal tests for Z weighting, other electric signal tests.)

3. Adjustments to indicated sound levels:

Type of Calibrator B&K 4231

Sound Pressure Level 93.8 dB

Equivalent Free-field Sound Level (reference environment conditions) 93.8 dB

Nominal frequency /Hz	Frequency weighting / dB			Nominal frequency /Hz	Frequency weighting / dB		
	A	C	Z		A	C	Z
10	-71.0	-14.4	-0.9	1000	0.0	-0.1	-0.3
20	-50.4	-6.1	-0.1	2000	1.2	-0.2	0.2
31.5	-39.8	-3.1	0.0	4000	1.0	-0.9	0.3
63	-26.2	-0.9	0.3	8000	-1.0	-3.2	-0.5
125	-16.0	-0.3	0.1	12500	-4.5	-6.4	-0.7
250	-8.6	-0.1	0.1	16000	-9.6	-11.5	-1.3
500	-3.2	-0.1	0.1	20000	-23.9	-25.9	-0.8

6. Self-generated noise

Microphone replaced by electrical input signal device

8.9 dB(A)	16.6 dB(C)	19.8 dB(Z)
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7. F&S Weighting

Rate of the F weighting decrease (dB/s)	35.2
Rate of the S weighting decrease (dB/s)	4.4
Deviation of F&S	0.0

8. Level Linearity (A-weighting at frequency 1 kHz)

Reference sound level 90.0 dB

Max error at 10dB steps upper reference sound level -0.1 dB

Max error at 1dB steps within 5dB of the upper limit linear operating range 0.0 dB

Max error at 10dB steps below reference sound level 0.1 dB

Max error at 1dB steps within 5dB upper the lower limit linear operating range 0.2 dB

9. Tone burst response (A Weighting) :

Single Toneburst duration /ms	Toneburst response /dB			
	L _{Afmax} -L _A	L _{ASmax} -L _A	L _{Ae} -L _A	L _{AeqT} -L _A
500	0.0	-4.0	-2.9	-7.0
200	-1.0	-7.4	-6.9	-7.0
50	-18.0	-26.9	-26.9	-7.0
10	-27.2	/	-36.0	-7.0

10. Peak C sound level (500Hz) :

Cycle	One cycle	nominal value	Positive half	nominal value	Negative half	nominal value
LC _{peak} -LC(dB)	3.5	3.5	2.3	2.4	2.3	2.4

11. Overload indication: Pass

12. Statistical analysis function

Sweep signal maximum indicated sound level: 112.8 dB

Sweep amplitude: 40 dB

Scan cycle time: 60 S; Measurement period: 180 S.

Items	Measured value/dB	Theoretical calculated value/dB	Error/dB
L _{Aeq,T}	103.2	103.2	0.0

L5	110.8	110.8	0.0
L10	108.8	108.8	0.0
L50	92.9	92.8	0.1
L90	76.9	76.8	0.1
L95	75.0	74.8	0.2

Uncertainty of measurement results: 0.4 dB (k=2)

Environment conditions:

Air temperature: 20 °C
Relative humidity: 50 %
Static pressure: 100.6 kPa

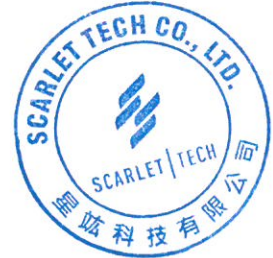
References:

IEC 61672-3 Sound Level Meters Part 3: Periodic tests

CERTIFICATE OF CALIBRATION

NO. 20200608004

Name of Product:	Sound Level Meter
Model:	ST-11D
Serial Number:	820204
Specification:	Class 1
Conclusion:	Pass
Date of calibration:	2020-12-31
Due Date:	2021-12-30



Calibrated by:

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- III. This certificate of calibration shall not be reproduced except in full, without written permission of the Scarlet Tech Co Ltd Taiwan.

1. Preliminary inspection: OK

4. Measuring up limit: 140 dBA

2. Type & serial No. of Microphone: AWA14425-40698

5. Frequency weightings (Acoustic signal tests for Z weighting, other electric signal tests.)

3. Adjustments to indicated sound levels:

Type of Calibrator B&K 4231

Sound Pressure Level 94.0 dB

Equivalent Free-field Sound Level (reference environment conditions) 93.8 dB

Nominal frequency /Hz	Frequency weighting / dB			Nominal frequency /Hz	Frequency weighting / dB		
	A	C	Z		A	C	Z
10	-70.9	-14.4	-0.6	1000	0.0	0.0	-0.1
20	-50.4	-6.2	-0.1	2000	1.2	-0.2	0.4
31.5	-39.4	-3.0	0.1	4000	1.1	-0.8	0.3
63	-26.3	-0.9	0.2	8000	-1.1	-3.1	0.0
125	-16.0	-0.3	0.1	12500	-6.0	-8.0	-0.9
250	-8.7	-0.1	0.2	16000	-11.9	-13.9	-0.7
500	-3.2	-0.1	0.2	20000	-24.0	-26.0	-0.6

6. Self-generated noise

Microphone replaced by electrical input signal device

13.2 dB(A)	16.6 dB(C)	19.8 dB(Z)
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7. F&S Weighting

Rate of the F weighting decrease (dB/s)	35.2
Rate of the S weighting decrease (dB/s)	4.4
Deviation of F&S	0.0

8. Level Linearity (A-weighting at frequency 1 kHz)

Reference sound level 90.0 dB

Max error at 10dB steps upper reference sound level -0.1 dB

Max error at 1dB steps within 5dB of the upper limit linear operating range 0.0 dB

Max error at 10dB steps below reference sound level -0.1 dB

Max error at 1dB steps within 5dB upper the lower limit linear operating range -0.1 dB

9. Tone burst response (A Weighting) :

Single Toneburst duration /ms	Toneburst response /dB			
	L _A F _{max} -L _A	L _A S _{max} -L _A	L _A E-L _A	L _A eqT-L _A
500	0.0	-4.0	-2.9	-7.0
200	-1.0	-7.4	-6.9	-7.0
50	-18.0	-26.9	-26.9	-7.0
10	-27.2	/	-36.0	-7.0

10. Peak C sound level (500Hz) :

Cycle	One cycle	nominal value	Positive half	nominal value	Negative half	nominal value
L _C peak-L _C (dB)	3.5	3.5	2.3	2.4	2.3	2.4

11. Overload indication: Pass

12. Statistical analysis function

Sweep signal maximum indicated sound level: 112.8 dB

Sweep amplitude: 40 dB

Scan cycle time: 60 S; Measurement period: 180 S.

Items	Measured value/dB	Theoretical calculated value/dB	Error/dB
L _A eq,T	103.2	103.2	0.0

L5	110.8	110.8	0.0
L10	108.8	108.8	0.0
L50	92.9	92.8	0.1
L90	76.9	76.8	0.1
L95	75.0	74.8	0.2

Uncertainty of measurement results: 0.4 dB (k=2)

Environment conditions:

Air temperature: 25 °C

Relative humidity: 50 %

Static pressure: 100.6 kPa

References:

IEC 61672-3 Sound Level Meters Part 3: Periodic tests



CERTIFICATE OF CALIBRATION

NO. 20200519066

Name of Product:	Sound Level Meter
Model:	ST-11D
Serial Number:	820346
Specification:	Class 1
Conclusion:	Pass
Date of calibration:	2021-01-18
Due Date:	2022-01-17



Calibrated by

- I. This report certifies that all calibration equipment used in the test is traceable with the internal ISO9001 procedures and meets all specification given in the Manual(s) or respectively surpass then, and applies only to the unit identified above.
- II. This certificate is produced with advanced equipment & procedures which permit comprehensive quality assurance verification of all data supplied herein.
- III. This certificate of calibration shall not be reproduced except in full, without written permission of the Scarlet Tech Co Ltd Taiwan.

1. Preliminary inspection: OK

4. Measuring up limit: 140 dBA

2. Type & serial No. of Microphone: AWA14425-14607

5. Frequency weightings (Acoustic signal tests for Z weighting, other electric signal tests.)

3. Adjustments to indicated sound levels:

Type of Calibrator B&K 4231

Sound Pressure Level 94.0 dB

Equivalent Free-field Sound Level (reference environment conditions) 93.8 dB

Nominal frequency /Hz	Frequency weighting / dB			Nominal frequency /Hz	Frequency weighting / dB		
	A	C	Z		A	C	Z
10	-71.3	-14.3	-0.9	1000	0.0	0.0	-0.2
20	-50.3	-6.2	0.1	2000	1.2	-0.2	0.3
31.5	-39.4	-3.1	-0.1	4000	1.1	-0.8	0.4
63	-26.3	-0.9	0.3	8000	-1.2	-3.1	-0.3
125	-16.0	-0.3	0.1	12500	-5.9	-7.9	-0.6
250	-8.7	-0.1	0.2	16000	-11.8	-13.8	-0.2
500	-3.2	-0.1	0.1	20000	-23.9	-25.9	0.1

6. Self-generated noise

Microphone replaced by electrical input signal device

10.4 dB(A)	11.5 dB(C)	19.7 dB(Z)
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7. F&S Weighting

Rate of the F weighting decrease (dB/s)	35.2
Rate of the S weighting decrease (dB/s)	4.4
Deviation of F&S	0.0

8. Level Linearity (A-weighting at frequency 1 kHz)

Reference sound level 90.0 dB

Max error at 10dB steps upper reference sound level -0.1 dB

Max error at 1dB steps within 5dB of the upper limit linear operating range 0.0 dB

Max error at 10dB steps below reference sound level 0.1 dB

Max error at 1dB steps within 5dB upper the lower limit linear operating range 0.2 dB

9. Tone burst response (A Weighting) :

Single Toneburst duration /ms	Toneburst response /dB			
	L _{Afmax} -L _A	L _{ASmax} -L _A	L _{Aε} -L _A	L _{AeqT} -L _A
500	0.0	-4.0	-2.9	-7.0
200	-1.0	-7.4	-6.9	-7.0
50	-18.0	-26.9	-26.9	-7.0
10	-27.2	/	-36.0	-7.0

10. Peak C sound level (500Hz) :

Cycle	One cycle	nominal value	Positive half	nominal value	Negative half	nominal value
LC _{peak} -LC(dB)	3.5	3.5	2.3	2.4	2.3	2.4

11. Overload indication: Pass

12. Statistical analysis function

Sweep signal maximum indicated sound level: 112.8 dB

Sweep amplitude: 40 dB

Scan cycle time: 60 S; Measurement period: 180 S.

Items	Measured value/dB	Theoretical calculated value/dB	Error/dB
L _{Aeq,T}	103.2	103.2	0.0

L5	110.8	110.8	0.0
L10	108.8	108.8	0.0
L50	92.9	92.8	0.1
L90	76.9	76.8	0.1
L95	75.0	74.8	0.2

Uncertainty of measurement results: 0.4 dB (k=2)

Environment conditions:

Air temperature: 20 °C

Relative humidity: 50 %

Static pressure: 100.6 kPa


References:

IEC 61672-3 Sound Level Meters Part 3: Periodic tests



MAXLAB

CALIBRATION CERTIFICATE

<i>Certificate Information</i>			
Date of Issue	7-Aug-2021	Certificate Number	MLCN212053S
<i>Customer Information</i>			
Company Name	Acuity Sustainability Consulting Limited		
Address	Unit C, 11/F., Ford Glory Plaza, Nos. 37-39 Wing Hing Street, Cheung Sha Wan, Kowloon, HK		
<i>Equipment-under-Test (EUT)</i>			
Description	Acoustic Calibrator		
Manufacturer	Pulsar		
Model Number	105		
Serial Number	63705		
Equipment Number	--		
<i>Calibration Particular</i>			
Date of Calibration	7-Aug-2021		
Calibration Equipment	4231(MLTE008) / AV200063 / 23-Jun-23 1357(MLTE190) / MLEC21/05/02 / 26-May-22		
Calibration Procedure	MLCG00, MLCG15		
Calibration Conditions	Laboratory	Temperature	23 °C ± 5 °C
		Relative Humidity	55% ± 25%
	EUT	Stabilizing Time	Over 3 hours
		Warm-up Time	Not applicable
		Power Supply	Internal battery
Calibration Results	Calibration data were detailed in the continuation pages. All calibration results were within EUT specification.		
<i>Approved By & Date</i>			
		K.O. Lo	7-Aug-2021
<i>Statements</i>			
<ul style="list-style-type: none">* Calibration equipment used for this calibration are traceable to national / international standards.* The results on this Calibration Certificate only relate to the values measured at the time of the calibration and the uncertainties quoted will not include allowance for the EUT long term drift, variation with environmental changes, vibration and shock during transportation, overloading, mishandling, misuse, and the capacity of any other laboratory to repeat the measurement.* MaxLab Calibration Centre Limited shall not be liable for any loss or damage resulting from the use of the EUT.* The copy of this Certificate is owned by MaxLab Calibration Centre Limited. No part of this Certificate may be reproduced without the prior written approval of MaxLab Calibration Centre Limited.			



MAXLAB

Certificate No.

MLCN212053S

<i>Calibration Data</i>				
EUT Setting	Standard Reading	EUT Error from Setting	Calibration Uncertainty	EUT Specification
94 dB	93.9 dB	-0.1 dB	0.20 dB	± 0.2 dB

- END -

Calibrated By : Keneth
Date : 7-Aug-21

Checked By : K.O. Lo
Date : 7-Aug-21

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