

# Appendix E

# 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 <sub>AFmax</sub> -L <sub>A</sub>	L <sub>ASmax</sub> -L <sub>A</sub>	L <sub>AE</sub> -L <sub>A</sub>	L <sub>AeqT</sub> -L <sub>A</sub>
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 <sub>Cpeak</sub> -L <sub>C</sub> (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 <sub>Aeq,T</sub>	103.2	103.2	0.0

<b>L5</b>	110.8	110.8	0.0
<b>L10</b>	108.8	108.8	0.0
<b>L50</b>	92.9	92.8	0.1
<b>L90</b>	76.9	76.8	0.1
<b>L95</b>	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 <sub>Afmax</sub> -L <sub>A</sub>	L <sub>ASmax</sub> -L <sub>A</sub>	L <sub>Ae</sub> -L <sub>A</sub>	L <sub>AeqT</sub> -L <sub>A</sub>
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 <sub>peak</sub> -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 <sub>Aeq,T</sub>	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

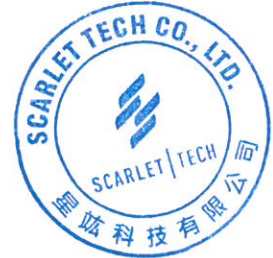
**References:**

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:

- 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: AWA14425-40698

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 <sub>A</sub> F <sub>max</sub> -L <sub>A</sub>	L <sub>A</sub> S <sub>max</sub> -L <sub>A</sub>	L <sub>A</sub> E-L <sub>A</sub>	L <sub>A</sub> eqT-L <sub>A</sub>
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 <sub>C</sub> peak-L <sub>C</sub> (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 <sub>A</sub> eq,T	103.2	103.2	0.0

<b>L5</b>	110.8	110.8	0.0
<b>L10</b>	108.8	108.8	0.0
<b>L50</b>	92.9	92.8	0.1
<b>L90</b>	76.9	76.8	0.1
<b>L95</b>	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 <sub>Afmax</sub> -L <sub>A</sub>	L <sub>ASmax</sub> -L <sub>A</sub>	L <sub>Aε</sub> -L <sub>A</sub>	L <sub>AeqT</sub> -L <sub>A</sub>
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 <sub>peak</sub> -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 <sub>Aeq,T</sub>	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