

APPENDIX 10.4

CALIBRATION CERTIFICATES OF NOISE INSTRUMENTS

APPENDIX 10.4

Calibration Certificates of Noise Instruments

Calibration Certificate

Certificate Number 2022002771

Customer:

Environmental Measurement
Unit 12 Tallaght Business Centre
Whitestown Business Park
Dublin, 24, Ireland

Model Number LxT SE

Serial Number 0007038

Test Results Pass

Initial Condition As Manufactured

Description Sound Expert LxT
Class 1 Sound Level Meter
Firmware Revision: 2,404

Procedure Number D0001.8384

Technician Jacob Cannon

Calibration Date 7 Mar 2022

Calibration Due

Temperature 23.56 °C ± 0.25 °C

Humidity 49.8 %RH ± 2.0 %RH

Static Pressure 86.66 kPa ± 0.13 kPa

Evaluation Method

Tested with:

Larson Davis PRMLxT1L, S/N 077600
Larson Davis CAL291, S/N 0108
PCB 377B02, S/N 336072
Larson Davis CAL200, S/N 9079

Data reported in dB re 20 µPa.

Compliance Standards Compliant to Manufacturer Specifications and the following standards when combined with Calibration Certificate from procedure D0001,8378:

IEC 60651:2001 Type 1	ANSI S1.4-2014 Class 1
IEC 60804:2000 Type 1	ANSI S1.4 (R2006) Type 1
IEC 61252:2002	ANSI S1.11 (R2009) Class 1
IEC 61260:2001 Class 1	ANSI S1.25 (R2007)
IEC 61672:2013 Class 1	ANSI S1.43 (R2007) Type 1

Issuing lab certifies that the instrument described above meets or exceeds all specifications as stated in the referenced procedure (unless otherwise noted). It has been calibrated using measurement standards traceable to the International System of Units (SI) through the National Institute of Standards and Technology (NIST), or other national measurement institutes, and meets the requirements of ISO/IEC 17025:2017.

Test points marked with a ‡ in the uncertainties column do not fall within this laboratory's scope of accreditation.

The quality system is registered to ISO 9001:2015.

This calibration is a direct comparison of the unit under test to the listed reference standards and did not involve any sampling plans to complete. No allowance has been made for the instability of the test device due to use, time, etc. Such allowances would be made by the customer as needed.

The uncertainties were computed in accordance with the ISO Guide to the Expression of Uncertainty in Measurement (GUM). A coverage factor of approximately 2 sigma (k=2) has been applied to the standard uncertainty to express the expanded uncertainty at approximately 95% confidence level.

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Correction data from Larson Davis LxT Manual for SoundTrack LxT & SoundExpert LxT, I770.01 Rev J Supporting Firmware Version 2.301, 2015-04-30

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A PCB DIVISION

D0001.8406 Rev F



MTS Calibration Ltd,
The Grange Business Centre,
Belasis Avenue,
Billingham TS23 1LG,
England
Telephone: 01642 876 410

CERTIFICATE OF CALIBRATION

Page 1 of 11 pages

Issued by: **MTS Calibration Ltd**

Approved Signatory:

Date of Issue: **02 February 2021** Certificate Number: **35442**

Tony Sherris

Sound Level Meter

Sound Level Meter Periodic Tests to EN 61672-3: 2013 Class 1

Client: Environmental Measurements
Unit 12, Tallaght Business Centre
Whitestown Business Park
Co.Dublin 24, Ireland

Instrument Make: Larson Davis
Instrument Model: LxT1L
Serial Number: 0005660

Associated Equipment	Make	Model	Serial number
Preamplifier	Larson Davis	PRMLxT1L	055806
Microphone	PCB	377B02	316352
Calibrator	Briel & Kjaer	4231	3014620
Calibrator supplied by	MTS for this calibration		

Test results summary, detailed results are shown on subsequent pages.

Periodic tests were performed in accordance with procedures from IEC 61672-3:2013 Class 1



Tests performed	Section	Results of test	Page	Comments
Calibration Certificate	22		1	
Additional information			2	
Indication with Calibrator Supplied	10	No Limit	3	
Self-Generated Noise	11	No Limit	3	
Frequency and Time-weightings at 1kHz	14	Complies	3	
Long term stability	15	Complies	3	
High stability	21	Complies	3	
Acoustic Tests	12	Complies	4	
Frequency Weighting A	13	Complies	5	
Frequency Weighting C	13	Complies	6	
Frequency Weighting Z	13	Complies	7	
Level Linearity	16	Complies	8	
Level Linearity Range Control	17		n/a	SLM only has one range
Tone-burst Response	18	Complies	9	
Peak C sound level	19	Complies	10	
Overload indication	20	Complies	11	

The instrument was within the above specification as received - no modifications were made

The sound level meter submitted for testing has successfully completed the periodic tests of IEC 61672-3: 2013 for the environmental conditions under which the tests were performed. As evidence was publicly available, from an independent testing organisation responsible for approving the results of pattern evaluation tests performed in accordance with IEC 61672-2: 2013, to demonstrate that the model of sound level meter fully conformed to the Class 1 specifications in IEC 61672-1: 2013, the sound level meter submitted for testing conforms to the Class 1 specifications of IEC 61672-1: 2013

Additional tests performed	Reference	
Microphone full frequency response	35444	See additional certificate
Filter calibration, third octave or octave	35442F	See additional certificate

This certificate is issued in accordance with the laboratory accreditation requirements of the United Kingdom Accreditation Service. It provides traceability of measurement to the SI system of units and/or to units of measurement realised at the National Physical Laboratory or other recognised national metrology institutes. This certificate may not be reproduced other than in full, except with the prior written approval of the issuing laboratory.

	<p>MTS Calibration Ltd, The Grange Business Centre, Belasis Avenue, Billingham TS23 1LG, England Telephone: 01642 876 410</p>																				
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<p>Date of Issue: 04 February 2021 Certificate Number: 35457</p>																					
Sound Level Meter																					
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<p><i>Client:</i> Environmental Measurements Unit 12, Tallaght Business Centre Whitestown Business Park Co.Dublin 24, Ireland</p>	<p><i>Instrument Make:</i> Larson Davis <i>Instrument Model:</i> LxT1L <i>Serial Number:</i> 0004647</p>																				
9	<table style="width: 100%; border-collapse: collapse;"> <thead> <tr> <th style="text-align: left; font-weight: normal;">Associated Equipment</th> <th style="text-align: left; font-weight: normal;">Make</th> <th style="text-align: left; font-weight: normal;">Model</th> <th style="text-align: left; font-weight: normal;">Serial number</th> </tr> </thead> <tbody> <tr> <td><i>Preamplifier</i></td> <td>Larson Davis</td> <td>PRMLxT1L</td> <td>042725</td> </tr> <tr> <td><i>Microphone</i></td> <td>PCB</td> <td>377B02</td> <td>171552</td> </tr> <tr> <td><i>Calibrator</i></td> <td>Brüel & Kjær</td> <td>4231</td> <td>2326247</td> </tr> <tr> <td><i>Calibrator supplied by</i></td> <td colspan="3">MTS for this calibration</td> </tr> </tbody> </table>	Associated Equipment	Make	Model	Serial number	<i>Preamplifier</i>	Larson Davis	PRMLxT1L	042725	<i>Microphone</i>	PCB	377B02	171552	<i>Calibrator</i>	Brüel & Kjær	4231	2326247	<i>Calibrator supplied by</i>	MTS for this calibration		
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The instrument required repair in order to meet the above specifications.																					
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Additional tests performed		Reference																			
Microphone full frequency response		35459		See additional certificate																	
Filter calibration, third octave or octave		35457F		See additional certificate																	
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Calibration Certificate

Certificate Number 2022002441

Customer:

Environmental Measurement
Unit 12 Tallaght Business Centre
Whitestown Business Park
Dublin, 24, Ireland

Model Number LxT SE
Serial Number 0007030
Test Results **Pass**
Initial Condition As Manufactured
Description Sound Expert LxT
Class 1 Sound Level Meter
Firmware Revision: 2,404

Procedure Number D0001.8384
Technician Jacob Cannon
Calibration Date 1 Mar 2022
Calibration Due
Temperature 23.54 °C ± 0.25 °C
Humidity 51.1 %RH ± 2.0 %RH
Static Pressure 87.07 kPa ± 0.13 kPa

Evaluation Method **Tested with:** **Data reported in dB re 20 µPa.**

Larson Davis PRMLxT1L, S/N 077596
PCB 377B02, S/N 335772
Larson Davis CAL291, S/N 0203
Larson Davis CAL200, S/N 6768

Compliance Standards Compliant to Manufacturer Specifications and the following standards when combined with Calibration Certificate from procedure D0001,8378:

IEC 60651:2001 Type 1	ANSI S1.4-2014 Class 1
IEC 60804:2000 Type 1	ANSI S1.4 (R2006) Type 1
IEC 61252:2002	ANSI S1.11 (R2009) Class 1
IEC 61260:2001 Class 1	ANSI S1.25 (R2007)
IEC 61672:2013 Class 1	ANSI S1.43 (R2007) Type 1

Issuing lab certifies that the instrument described above meets or exceeds all specifications as stated in the referenced procedure (unless otherwise noted). It has been calibrated using measurement standards traceable to the International System of Units (SI) through the National Institute of Standards and Technology (NIST), or other national measurement institutes, and meets the requirements of ISO/IEC 17025:2017.

Test points marked with a ‡ in the uncertainties column do not fall within this laboratory's scope of accreditation.

The quality system is registered to ISO 9001:2015.

This calibration is a direct comparison of the unit under test to the listed reference standards and did not involve any sampling plans to complete. No allowance has been made for the instability of the test device due to use, time, etc. Such allowances would be made by the customer as needed.

The uncertainties were computed in accordance with the ISO Guide to the Expression of Uncertainty in Measurement (GUM). A coverage factor of approximately 2 sigma (k=2) has been applied to the standard uncertainty to express the expanded uncertainty at approximately 95% confidence level.

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Correction data from Larson Davis LxT Manual for SoundTrack LxT & SoundExpert LxT, I770.01 Rev J Supporting Firmware Version 2,301, 2015-04-30

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D0001.8406 Rev F

Calibration Certificate

Certificate Number 2021014392

Customer:

Environmental Measurement
Unit 12 Tallaght Business Centre
Whitestown Business Park
Dublin, 24, Ireland

Model Number	LxT SE	Procedure Number	D0001,8378
Serial Number	0006870	Technician	Ron Harris
Test Results	Pass	Calibration Date	10 Nov 2021
Initial Condition	As Manufactured	Calibration Due	
Description	Sound Expert LxT Class 1 Sound Level Meter Firmware Revision: 2.404	Temperature	23,5 °C ± 0,25 °C
		Humidity	53 %RH ± 2,0 %RH
		Static Pressure	86.69 kPa ± 0.13 kPa

Evaluation Method Tested electrically using Larson Davis PRMLxT1L S/N 070116 and a 12.0 pF capacitor to simulate microphone capacitance. Data reported in dB re 20 µPa assuming a microphone sensitivity of 23,6 mV/Pa.

Compliance Standards Compliant to Manufacturer Specifications and the following standards when combined with Calibration Certificate from procedure D0001.8384:

IEC 60651:2001 Type 1	ANSI S1.4-2014 Class 1
IEC 60804:2000 Type 1	ANSI S1.4 (R2006) Type 1
IEC 61252:2002	ANSI S1.25 (R2007)
IEC 61672:2013 Class 1	ANSI S1.43 (R2007) Type 1
IEC 61260:2001 Class 1	ANSI S1.11 (R2009) Class 1

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The quality system is registered to ISO 9001:2015.

This calibration is a direct comparison of the unit under test to the listed reference standards and did not involve any sampling plans to complete. No allowance has been made for the instability of the test device due to use, time, etc. Such allowances would be made by the customer as needed.

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Correction data from Larson Davis LxT Manual for SoundTrack LxT & SoundExpert LxT, I770,01 Rev O Supporting Firmware Version 4.0.5, 2019-09-10

Calibration Check Frequency: 1000 Hz; Reference Sound Pressure Level: 114 dB re 20 µPa

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Calibration Certificate

Certificate Number 2022002771

Customer:

Environmental Measurement
Unit 12 Tallaght Business Centre
Whitestown Business Park
Dublin, 24, Ireland

Model Number LxT SE
Serial Number 0007038
Test Results **Pass**
Initial Condition As Manufactured
Description Sound Expert LxT
Class 1 Sound Level Meter
Firmware Revision: 2,404

Procedure Number D0001.8384
Technician Jacob Cannon
Calibration Date 7 Mar 2022
Calibration Due
Temperature 23.56 °C ± 0.25 °C
Humidity 49.8 %RH ± 2.0 %RH
Static Pressure 86.66 kPa ± 0.13 kPa

Evaluation Method **Tested with:** **Data reported in dB re 20 µPa.**

Larson Davis PRMLxT1L, S/N 077600
Larson Davis CAL291, S/N 0108
PCB 377B02, S/N 336072
Larson Davis CAL200, S/N 9079

Compliance Standards Compliant to Manufacturer Specifications and the following standards when combined with Calibration Certificate from procedure D0001,8378:

IEC 60651:2001 Type 1	ANSI S1.4-2014 Class 1
IEC 60804:2000 Type 1	ANSI S1.4 (R2006) Type 1
IEC 61252:2002	ANSI S1.11 (R2009) Class 1
IEC 61260:2001 Class 1	ANSI S1.25 (R2007)
IEC 61672:2013 Class 1	ANSI S1.43 (R2007) Type 1

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Correction data from Larson Davis LxT Manual for SoundTrack LxT & SoundExpert LxT, I770.01 Rev J Supporting Firmware Version 2,301, 2015-04-30

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Calibration Certificate

Certificate Number 2021014391

Customer:

Environmental Measurement
Unit 12 Tallaght Business Centre
Whitestown Business Park
Dublin, 24, Ireland

Model Number LxT SE

Serial Number 0006869

Test Results **Pass**

Initial Condition As Manufactured

Description Sound Expert LxT
Class 1 Sound Level Meter
Firmware Revision: 2.404

Procedure Number D0001,8378

Technician Ron Harris

Calibration Date 10 Nov 2021

Calibration Due

Temperature 23.41 °C ± 0.25 °C

Humidity 53.2 %RH ± 2.0 %RH

Static Pressure 86.63 kPa ± 0.13 kPa

Evaluation Method Tested electrically using Larson Davis PRMLxT1L S/N 070113 and a 12.0 pF capacitor to simulate microphone capacitance. Data reported in dB re 20 µPa assuming a microphone sensitivity of 23.6 mV/Pa.

Compliance Standards Compliant to Manufacturer Specifications and the following standards when combined with Calibration Certificate from procedure D0001.8384:

IEC 60651:2001 Type 1	ANSI S1.4-2014 Class 1
IEC 60804:2000 Type 1	ANSI S1.4 (R2006) Type 1
IEC 61252:2002	ANSI S1.25 (R2007)
IEC 61672:2013 Class 1	ANSI S1.43 (R2007) Type 1
IEC 61260:2001 Class 1	ANSI S1.11 (R2009) Class 1

Issuing lab certifies that the instrument described above meets or exceeds all specifications as stated in the referenced procedure (unless otherwise noted). It has been calibrated using measurement standards traceable to the International System of Units (SI) through the National Institute of Standards and Technology (NIST), or other national measurement institutes, and meets the requirements of ISO/IEC 17025:2017. **Test points marked with a ‡ in the uncertainties column do not fall within this laboratory's scope of accreditation.**

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Correction data from Larson Davis LxT Manual for SoundTrack LxT & SoundExpert LxT, I770.01 Rev O Supporting Firmware Version 4.0.5, 2019-09-10

Calibration Check Frequency: 1000 Hz; Reference Sound Pressure Level: 114 dB re 20 µPa

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