

Appendix 11-2

Calibration Certs

CERTIFICATE OF CALIBRATION

No: CDK1814233

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CALIBRATION OFSound Level Meter: Brüel & Kjær Type 2238
Microphone: Brüel & Kjær Type 4188No: 2151874 Id: -
No: 2380127**CUSTOMER**Enfonic Ltd
Charlestown Centre
Dublin
D11 KXC7
Ireland**CALIBRATION CONDITIONS**Preconditioning: 4 hours at $23^{\circ}\text{C} \pm 3^{\circ}\text{C}$ Environment conditions: Pressure: $101,3\text{kPa} \pm 3\text{kPa}$. Humidity: 25% - 70% RH. Temperature: $23^{\circ}\text{C} \pm 3^{\circ}\text{C}$.**SPECIFICATIONS**

The Sound Level Meter Brüel & Kjær Type 2238 has been calibrated in accordance with the requirements as specified in IEC 60651 and 60804 type 1. The accreditation assures the traceability to the international units system SI.

PROCEDURE

The measurements have been performed with the assistance of Brüel & Kjær Sound Level Meter Calibration System 3630 with application software type 7763 (version 5.0 - DB: 5.00) by using procedure 2238-4188-BZ7125.

RESULTSCalibration Mode: **Calibration as received.**

The reported expanded uncertainty is based on the standard uncertainty multiplied by a coverage factor $k = 2$ providing a level of confidence of approximately 95 %. The uncertainty evaluation has been carried out in accordance with EA-4/02 from elements originating from the standards, calibration method, effect of environmental conditions and any short time contribution from the device under calibration.

Date of calibration: 24-09-2018

Date of issue: 24-09-2018

Mikail Önder
Calibration TechnicianErik Bruus
Approved Signatory

CERTIFICATE OF CALIBRATION

No: CDK1782708

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CALIBRATION OFSound Level Meter: Brüel & Kjær Type 2238
Microphone: Brüel & Kjær Type 4188No: 2343753 Id: -
No: 2555128**CUSTOMER**Enfonic Ltd
Charlestown Centre
Dublin
D11 KXC7
Ireland**CALIBRATION CONDITIONS**

Preconditioning: 4 hours at 23°C ± 3°C

Environment conditions: Pressure: 101,3kPa ± 3kPa. Humidity: 25% - 70% RH. Temperature: 23°C ± 3°C.

SPECIFICATIONS

The Sound Level Meter Brüel & Kjær Type 2238 has been calibrated in accordance with the requirements as specified in IEC 60651 and 60804 type 1. The accreditation assures the traceability to the international units system SI.

PROCEDURE

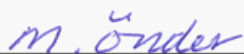
The measurements have been performed with the assistance of Brüel & Kjær Sound Level Meter Calibration System 3630 with application software type 7763 (version 5.0 - DB: 5.00) by using procedure 2238-4188-BZ7125.

RESULTSCalibration Mode: **Calibration as received.**

The reported expanded uncertainty is based on the standard uncertainty multiplied by a coverage factor $k = 2$ providing a level of confidence of approximately 95 %. The uncertainty evaluation has been carried out in accordance with EA-4/02 from elements originating from the standards, calibration method, effect of environmental conditions and any short time contribution from the device under calibration.

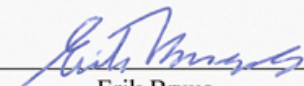
Date of calibration: 14-07-2018

Date of issue: 14-07-2018



Mikail Önder

Calibration Technician



Erik Bruus

Approved Signatory

CERTIFICATE OF CALIBRATION

No: CDK1782788

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CALIBRATION OFSound Level Meter: Brüel & Kjær Type 2238
Microphone: Brüel & Kjær Type 4188No: 2562556 Id: -
No: 2274039**CUSTOMER**Enfonic Ltd
Charlestown Centre
Dublin
D11 KXC7
Ireland**CALIBRATION CONDITIONS**

Preconditioning: 4 hours at 23°C ± 3°C

Environment conditions: Pressure: 101,3kPa ± 3kPa. Humidity: 25% - 70% RH. Temperature: 23°C ± 3°C.

SPECIFICATIONS

The Sound Level Meter Brüel & Kjær Type 2238 has been calibrated in accordance with the requirements as specified in IEC 60651 and 60804 type 1. The accreditation assures the traceability to the international units system SI.

PROCEDURE

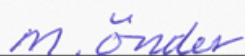
The measurements have been performed with the assistance of Brüel & Kjær Sound Level Meter Calibration System 3630 with application software type 7763 (version 5.0 - DB: 5.00) by using procedure 2238-4188-BZ7125.

RESULTSCalibration Mode: **Calibration as received.**

The reported expanded uncertainty is based on the standard uncertainty multiplied by a coverage factor $k = 2$ providing a level of confidence of approximately 95 %. The uncertainty evaluation has been carried out in accordance with EA-4/02 from elements originating from the standards, calibration method, effect of environmental conditions and any short time contribution from the device under calibration.

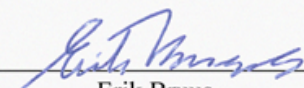
Date of calibration: 15-07-2018

Date of issue: 15-07-2018



Mikail Önder

Calibration Technician



Erik Bruus

Approved Signatory

CERTIFICATE OF CALIBRATION

No: CDK1819116

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CALIBRATION OFSound Level Meter: Brüel & Kjær Type 2238
Microphone: Brüel & Kjær Type 4188
Supplied Calibrator: NoneNo: 2756962 Id: -
No: 2746328**CUSTOMER**Enfonic Ltd
Level 2, Charlestown Centre
Dublin
D11 KXC7
Ireland**CALIBRATION CONDITIONS**

Preconditioning: 4 hours at 23°C ± 3°C

Environment conditions: *See actual values in Environmental conditions sections.***SPECIFICATIONS**

The Sound Level Meter Brüel & Kjær Type 2238 has been calibrated in accordance with the requirements as specified in IEC6162-1:2013 class 1. Procedures from IEC 61672-3:2013 were used perform the periodic tests. The accreditation assures the traceability of the international units system SI.

PROCEDURE

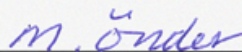
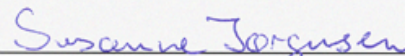
The measurements have been performed with the assistance of Brüel & Kjær Sound Level Meter Calibration System 3630 with application software type 7763 (version 7.0 - DB: 7.00) by using procedure B&K proc 2238-4188-BZ7125

RESULTSCalibration Mode: **Calibration as received.**

The reported expanded uncertainty is based on the standard uncertainty multiplied by a coverage factor $k = 2$ providing a level of confidence of approximately 95 %. The uncertainty evaluation has been carried out in accordance with EA-4/02 from elements originating from the standards, calibration method, effect of environmental conditions and any short time contribution from the device under calibration.

Date of calibration: 2018-09-26

Date of issue: 2018-09-26

Mikail Önder
Calibration TechnicianSusanne Jørgensen
Approved Signatory

Certificate of Calibration

Issued by University of Salford (Acoustics Calibration Laboratory)
UKAS ACCREDITED CALIBRATION LABORATORY NO. 0801



0801

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APPROVED SIGNATORIES

Claire Lomax [x] Andy Moorhouse []
Gary Phillips [] Danny McCaul []

acoustic calibration laboratory

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University of
Salford
MANCHESTER

Certificate Number: 04142/2

Date of Issue: 6 March 2019

PERIODIC TEST OF A SOUND LEVEL METER to IEC 61672-3:2006

FOR:	Enfonic Ltd Office Suites, Level 2 Charlestown Centre St. Margaret's Road Dublin, D11 KXC7
FOR THE ATTENTION OF:	Gary Duffy
PERIODIC TEST DATE:	06/03/2019
TEST PROCEDURE:	CTP12 (Laboratory Manual)

Sound Level Meter Details

Manufacturer	Bruel & Kjaer
Model	2250
Serial number	2567756
Class	1
Hardware version: 2.0	Sound Level Meter Software BZ7222 Version 4.7.5

Associated Items	Microphone	Preamplifier	Calibrator
Manu	Bruel & Kjaer	Bruel & Kjaer	Bruel & Kjaer
Model	4189	ZC 0032	4231
Serial Number	2470482	3418	3011175
Calibrator Adaptor	-	-	UC0210

Test Engineer (initial):

GP

Name:

Gary Phillips

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 the 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.

Certificate of Calibration

Issued by University of Salford (Acoustics Calibration Laboratory)
UKAS ACCREDITED CALIBRATION LABORATORY NO. 0801

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Certificate Number: 04142/2

Date of Issue: 6 March 2019

Procedures from IEC 61672-3: 2006 and TPS 49 Edition 2 June 2009 were used to perform the periodic tests.

The manufacturer's instruction manual was marked as follows: B&K 2250 BE 1712-15 April 2007 from hardware version 1.1. Adjustment data used to adjust the sound levels indicated in response to the application of a multi-frequency sound calibrator to sound levels equivalent to those that would be indicated in response to plane, progressive sound waves were obtained from the manufacturer's instruction manual referred to in this certificate. The sound level meter calibration check frequency is 1000 Hz, the reference sound pressure level is 94 dB. As this instrument only has a single range, this range is the reference level range.

The environmental conditions in the laboratory at the start of the test were:

Static pressure $97.921 \text{ kPa} \pm 0.015 \text{ kPa}$; air temperature $22.6 \text{ }^\circ\text{C} \pm 0.4 \text{ }^\circ\text{C}$; relative humidity $42.0 \% \pm 2.4 \%$.

The initial response of the instrument to application of the associated sound calibrator was 94.2 dB (C). No adjustment of the instrument was required. This indication was obtained from the calibration certificate of the calibrator, 04142/1 and information in the manufacturer's instruction manual specified in this certificate, when the instrument is configured as follows; Input: Top socket, Transducer: 4189 (2470482), Sound Field Correction: Free-field, Windscreen Auto Detect: Off, Windscreen Correction: None. The instrument was calibrated without a windshield. Consult manufacturer's instructions if using a windshield.

With the microphone installed the level of self-generated noise was:

A: 17.1 dB*

* Under-range indicated on instrument display.

With the microphone replaced by the electrical input device specified in the manufacturer's instruction manual, the levels of self-generated noise were:

A: 13.0 dB*

B: 12.3 dB*

C: 13.9 dB*

ZLF normal: 19.4 dB*

ZLF extended: 25.3 dB*

* Under-range indicated on instrument display.

The environmental conditions in the laboratory at the end of the test were:

Static pressure $97.840 \text{ kPa} \pm 0.015 \text{ kPa}$; air temperature $22.7 \text{ }^\circ\text{C} \pm 0.4 \text{ }^\circ\text{C}$; relative humidity $40.8 \% \pm 2.4 \%$.

Certificate of Calibration

Issued by University of Salford (Acoustics Calibration Laboratory)
UKAS ACCREDITED CALIBRATION LABORATORY NO. 0801

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Certificate Number: 04142/2

Date of Issue: 6 March 2019

The sound level meter submitted for testing has successfully completed the class 1 periodic tests of IEC 61672-3:2006, for the environmental conditions under which the tests were performed. As public evidence was available, from an independent testing organization responsible for approving the results of pattern evaluation tests performed in accordance with IEC 61672-2:2003, to demonstrate that the model of sound level meter fully conformed to the requirements in IEC 61672-1:2002, the sound level meter submitted for testing conforms to the class 1 requirements of IEC 61672-1:2002.

The microphone corrections applied as specified in 12.6 of IEC 61672-3:2006 were obtained from a frequency response measured by this Laboratory using the electrostatic actuator method. This response in isolation is not covered by our UKAS accreditation.

Instruments used in the verification procedure were traceable to *National Standards*. The multi-frequency calibrator method was employed in the acoustical tests of a frequency weighting.

The uncertainty evaluation has been carried out in accordance with UKAS requirements. All measurement results are retained at the acoustic calibration laboratory for at least four years.

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 the 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.

CERTIFICATE OF CALIBRATION

No: CDK1806788

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CALIBRATION OF

Sound Level Meter:	Brüel & Kjær Type 2250	No: 2837940	Id: - 2837940
Microphone:	Brüel & Kjær Type 4189	No: 2799522	
Preamplifier:	Brüel & Kjær Type ZC-0032	No: 05085	
Supplied Calibrator:	None		
Software version:	BZ7222 Version 4.7.4	Pattern Approval:	PTB1.63-40478500 / 1.63-4078502
Instruction manual:	BE1712-22		

CUSTOMER

Enfonic Ltd
Level 2, Charlestown Centre
Dublin
D11 KXC7
Ireland

CALIBRATION CONDITIONS

Preconditioning: 4 hours at 23°C ± 3°C
Environment conditions: *See actual values in Environmental conditions sections.*

SPECIFICATIONS

The Sound Level Meter Brüel & Kjær Type 2250 has been calibrated in accordance with the requirements as specified in IEC6162-1:2013 class 1. Procedures from IEC 61672-3:2013 were used perform the periodic tests. The accreditation assures the traceability of the international units system SI.

PROCEDURE

The measurements have been performed with the assistance of Brüel & Kjær Sound Level Meter Calibration System 3630 with application software type 7763 (version 7.0 - DB: 7.00) by using procedure B&K proc 2250, 4189 (IEC61672:2013)

RESULTS

Calibration Mode: **Calibration as received.**

The reported expanded uncertainty is based on the standard uncertainty multiplied by a coverage factor $k = 2$ providing a level of confidence of approximately 95 %. The uncertainty evaluation has been carried out in accordance with EA-4/02 from elements originating from the standards, calibration method, effect of environmental conditions and any short time contribution from the device under calibration.

Date of calibration: 2018-08-24

Date of issue: 2018-08-24


Mikail Önder

Calibration Technician


Susanne Jørgensen

Approved Signatory

CERTIFICATE OF CALIBRATION

No: CDK1811141

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CALIBRATION OF

Sound Level Meter:	Brüel & Kjær Type 2250	No: 2654662	Id: - 2654662
Microphone:	Brüel & Kjær Type 4950	No: 2626990	
Preamplifier:	Brüel & Kjær Type ZC-0032	No: 25273	
Supplied Calibrator:	Brüel & Kjær Type 4231	No: 3005620	
Software version:	BZ7222 Version 2.1	Pattern Approval:	PTB1.63-4046158
Instruction manual:	BE1712-18		

CUSTOMER

Enfonic Ltd
Level 2, Charlestown Centre
Dublin
D11 KXC7
Ireland

CALIBRATION CONDITIONS

Preconditioning: 4 hours at 23°C ± 3°C
Environment conditions: *See actual values in Environmental conditions sections.*

SPECIFICATIONS

The Sound Level Meter Brüel & Kjær Type 2250 has been calibrated in accordance with the requirements as specified in IEC61672-1:2002 class 1. Procedures from IEC 61672-3:2006 were used to perform the periodic tests. The accreditation assures the traceability to the international units system SI.

PROCEDURE

The measurements have been performed with the assistance of Brüel & Kjær Sound Level Meter Calibration System 3630 with application software type 7763 (version 4.9 - DB: 4.90) by using procedure 2250-4189.

RESULTS

Calibration Mode: **Calibration as received.**

The reported expanded uncertainty is based on the standard uncertainty multiplied by a coverage factor $k = 2$ providing a level of confidence of approximately 95 %. The uncertainty evaluation has been carried out in accordance with EA-4/02 from elements originating from the standards, calibration method, effect of environmental conditions and any short time contribution from the device under calibration.

Date of calibration: 16-08-2018

Date of issue: 16-08-2018



Mikail Önder

Calibration Technician



Susanne Jørgensen

Approved Signatory

CERTIFICATE OF CALIBRATION

No: CDK1814233

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CALIBRATION OFSound Level Meter: Brüel & Kjær Type 2238
Microphone: Brüel & Kjær Type 4188No: 2151874 Id: -
No: 2380127**CUSTOMER**Enfonic Ltd
Charlestown Centre
Dublin
D11 KXC7
Ireland**CALIBRATION CONDITIONS**Preconditioning: 4 hours at $23^{\circ}\text{C} \pm 3^{\circ}\text{C}$ Environment conditions: Pressure: $101,3\text{kPa} \pm 3\text{kPa}$. Humidity: 25% - 70% RH. Temperature: $23^{\circ}\text{C} \pm 3^{\circ}\text{C}$.**SPECIFICATIONS**

The Sound Level Meter Brüel & Kjær Type 2238 has been calibrated in accordance with the requirements as specified in IEC 60651 and 60804 type 1. The accreditation assures the traceability to the international units system SI.

PROCEDURE

The measurements have been performed with the assistance of Brüel & Kjær Sound Level Meter Calibration System 3630 with application software type 7763 (version 5.0 - DB: 5.00) by using procedure 2238-4188-BZ7125.

RESULTSCalibration Mode: **Calibration as received.**

The reported expanded uncertainty is based on the standard uncertainty multiplied by a coverage factor $k = 2$ providing a level of confidence of approximately 95 %. The uncertainty evaluation has been carried out in accordance with EA-4/02 from elements originating from the standards, calibration method, effect of environmental conditions and any short time contribution from the device under calibration.

Date of calibration: 24-09-2018

Date of issue: 24-09-2018

Mikail Önder
Calibration TechnicianErik Bruus
Approved Signatory