

## Appendix 9.2 Calibration Certificates of Monitoring Equipment

This page is intentionally blank.



# CERTIFICATE OF CALIBRATION



0653

**Date of Issue: 05 April 2019**

**Certificate Number: UCRT19/1416**

Issued by:

ANV Measurement Systems

Beaufort Court


17 Roebuck Way

Milton Keynes MK5 8HL

Telephone 01908 642846 Fax 01908 642814

E-Mail: [info@noise-and-vibration.co.uk](mailto:info@noise-and-vibration.co.uk)

Web: [www.noise-and-vibration.co.uk](http://www.noise-and-vibration.co.uk)

Page 1 of 2 Pages
Approved Signatory 
K. Mistry

Acoustics Noise and Vibration Ltd trading as ANV Measurement Systems

Customer ANV Measurement Systems  
Beaufort Court  
17 Roebuck Way  
Milton Keynes  
MK5 8HL

Order No. ANV MS HIRE

Test Procedure Procedure TP 1 Calibration of Sound Calibrators

Description Acoustic Calibrator

Identification	Manufacturer	Instrument	Model	Serial No.
	Rion	Calibrator	NC-74	34536131

The calibrator has been tested as specified in Annex B of IEC 60942:2003. As public evidence was available from a testing organisation (PTB) responsible for approving the results of pattern evaluation tests, to demonstrate that the model of sound calibrator fully conformed to the requirements for pattern evaluation described in Annex A of IEC 60942:2003, the sound calibrator tested is considered to conform to all the class 1 requirements of IEC 60942:2003.

ANV Job No. UKAS19/04235

Date Received 04 April 2019

Date Calibrated 05 April 2019

Previous Certificate  
*Dated* 23 January 2018  
*Certificate No.* UCRT18/1062  
*Laboratory* 0653

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.

# CERTIFICATE OF CALIBRATION

Certificate Number

UCRT19/1416

UKAS Accredited Calibration Laboratory No. 0653

Page 2 of 2 Pages

## Measurements

The sound pressure level generated by the calibrator in its WS2 configuration was measured five times by the Insert Voltage Method using a microphone as detailed below. The mean of the results obtained is shown below. It is corrected to the standard atmospheric pressure of 101.3 kPa (1013 mBar) using original manufacturers information.

Test Microphone	Manufacturer	Type
	Brüel & Kjær	4134

## Results

The level of the calibrator output under the conditions outlined above was

94.02 ± 0.10 dB rel 20 µPa

## Functional Tests and Observations

The frequency of the sound produced was	1002.20 Hz	±	0.13 Hz
The total distortion was	1.48 %	±	6.6 % of Reading

During the measurements environmental conditions were

Temperature	22	to	23 °C
Relative Humidity	35	to	41 %
Barometric Pressure	99.0	to	99.1 kPa

The reported expanded uncertainty is based on a standard uncertainty multiplied by a coverage factor k=2, providing a coverage probability of approximately 95%. The uncertainty evaluation has been carried out in accordance with UKAS requirements.

The uncertainties refer to the measured values only with no account being taken of the ability of the instrument to maintain its calibration.

A small correction factor may need to be applied to the sound pressure level quoted above if the device is used to calibrate a sound level meter which is fitted with a free-field response microphone. See manufacturers handbook for details.

..... END .....

### **Note:**

Calibrator adjusted prior to calibration?	NO
Initial Level	N/A dB
Initial Frequency	N/A Hz

## Additional Comments

None

Calibrated by: B. Bogdan

R 2



# CERTIFICATE OF CALIBRATION



0653

**Date of Issue: 08 April 2019**

**Certificate Number: UCRT19/1437**

Issued by:

ANV Measurement Systems

Beaufort Court

17 Roebuck Way

Milton Keynes MK5 8HL

Telephone 01908 642846 Fax 01908 642814

E-Mail: info@noise-and-vibration.co.uk

Web: www.noise-and-vibration.co.uk

Acoustics Noise and Vibration Ltd trading as ANV Measurement Systems

Page 1 of 2 Pages
Approved Signatory
K. Mistry

**Customer** ANV Measurement Systems  
 Beaufort Court  
 17 Roebuck Way  
 Milton Keynes  
 MK5 8HL

**Order No.** ANV MS HIRE  
**Description** Sound Level Meter / Pre-amp / Microphone / Associated Calibrator  
**Identification**

Manufacturer	Instrument	Type	Serial No. / Version
Rion	Sound Level Meter	NL-52	00620868
Rion	Firmware		2.0
Rion	Pre Amplifier	NH-25	20928
Rion	Microphone	UC-59	03922
Rion	Calibrator	NC-74	34536109
	Calibrator adaptor type if applicable		NC-74-002

**Performance Class** 1  
**Test Procedure** TP 2.SLM 61672-3 TPS-49  
*Procedures from IEC 61672-3:2006 were used to perform the periodic tests.*

**Type Approved to IEC 61672-1:2002** YES Approval Number 21.21 / 13.02  
*If YES above there is public evidence that the SLM has successfully completed the applicable pattern evaluation tests of IEC 61672-2:2003*

**Date Received** 29 March 2019 ANV Job No. UKAS19/03205  
**Date Calibrated** 08 April 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 organisation 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.

Previous Certificate	Dated	Certificate No.	Laboratory
	07 November 2017	UCRT17/1997	0653

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.

# CERTIFICATE OF CALIBRATION

**Certificate Number**

**UCRT19/1437**

UKAS Accredited Calibration Laboratory No. 0653

Page 2 of 2 Pages

Sound Level Meter Instruction manual and data used to adjust the sound levels indicated.

SLM instruction manual title	Sound Level Meter	NL-42 / NL-52
SLM instruction manual ref / issue		11-03
SLM instruction manual source		Manufacturer
Internet download date if applicable		N/A
Case corrections available		Yes
Uncertainties of case corrections		Yes
Source of case data		Manufacturer
Wind screen corrections available		Yes
Uncertainties of wind screen corrections		Yes
Source of wind screen data		Manufacturer
Mic pressure to free field corrections		Yes
Uncertainties of Mic to F.F. corrections		Yes
Source of Mic to F.F. corrections		Manufacturer
Total expanded uncertainties within the requirements of IEC 61672-1:2002	Yes	
Specified or equivalent Calibrator		Specified
Customer or Lab Calibrator		Lab Calibrator
Calibrator adaptor type if applicable		NC-74-002
Calibrator cal. date		29 March 2019
Calibrator cert. number		UCRT19/1384
Calibrator cal cert issued by		0653
Calibrator SPL @ STP	93.98	dB Calibration reference sound pressure level
Calibrator frequency	1001.93	Hz Calibration check frequency
Reference level range	25 - 130	dB

Accessories used or corrected for during calibration - Extension Cable & Wind Shield WS-15  
 Note - if a pre-amp extension cable is listed then it was used between the SLM and the pre-amp.

Environmental conditions during tests	Start	End	
Temperature	22.82	22.96	± 0.40 °C
Humidity	41.2	43.0	± 3.00 %RH
Ambient Pressure	100.06	100.03	± 0.03 kPa

Response to associated Calibrator at the environmental conditions above.			
Initial indicated level	94.1	dB	Adjusted indicated level
			94.0 dB
The uncertainty of the associated calibrator supplied with the sound level meter ±			0.10 dB

Self Generated Noise This test is currently not performed by this Lab.

Microphone installed (if requested by customer) = Less Than	N/A	dB	A Weighting
Uncertainty of the microphone installed self generated noise ±	N/A	dB	

Microphone replaced with electrical input device -		UR = Under Range indicated					
Weighting	A	C	Z				
	12.0	16.4	22.0	dB	dB	dB	
				UR	UR	UR	
Uncertainty of the electrical self generated noise ±			0.12 dB				

The reported expanded uncertainty is based on a standard uncertainty multiplied by a coverage factor  $k=2$ , providing a coverage probability of approximately 95%. The uncertainty evaluation has been carried out in accordance with UKAS requirements.

For the test of the frequency weightings as per paragraph 12. of IEC 61672-3:2006 the actual microphone free field response was used.

The acoustical frequency tests of a frequency weighting as per paragraph 11 of IEC 61672-3:2006 were carried out using an electrostatic actuator.

..... END .....

Calibrated by: A Patel

R 1

Additional Comments

None



# CERTIFICATE OF CALIBRATION



0653

**Date of Issue: 12 August 2019**

**Certificate Number: UCRT19/1894**

Issued by:

ANV Measurement Systems

Beaufort Court

17 Roebuck Way


Milton Keynes MK5 8HL

Telephone 01908 642846 Fax 01908 642814

E-Mail: info@noise-and-vibration.co.uk

Web: www.noise-and-vibration.co.uk

Acoustics Noise and Vibration Ltd trading as ANV Measurement Systems

Page 1 of 2 Pages
Approved Signatory

K. Mistry

Customer ANV Measurement Systems  
 Beaufort Court  
 17 Roebuck Way  
 Milton Keynes  
 MK5 8HL

Order No. ANV MS HIRE  
 Description Sound Level Meter / Pre-amp / Microphone / Associated Calibrator  
 Identification

Manufacturer	Instrument	Type	Serial No. / Version
Rion	Sound Level Meter	NL-52	00586905
Rion	Firmware		2.0
Rion	Pre Amplifier	NH-25	87024
Rion	Microphone	UC-59	13363
Rion	Calibrator	NC-74	34536109
	Calibrator adaptor type if applicable		NC-74-002

Performance Class 1  
 Test Procedure TP 2.SLM 61672-3 TPS-49  
*Procedures from IEC 61672-3:2006 were used to perform the periodic tests.*

Type Approved to IEC 61672-1:2002 YES Approval Number 21.21 / 13.02  
*If YES above there is public evidence that the SLM has successfully completed the applicable pattern evaluation tests of IEC 61672-2:2003*

Date Received 09 August 2019 ANV Job No. UKAS19/08529  
 Date Calibrated 12 August 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 organisation 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.

Previous Certificate	Dated	Certificate No.	Laboratory
	09 July 2018	UCRT18/1694	0653

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.

# CERTIFICATE OF CALIBRATION

Certificate Number

UCRT19/1894

UKAS Accredited Calibration Laboratory No. 0653

Page 2 of 2 Pages

Sound Level Meter Instruction manual and data used to adjust the sound levels indicated.

SLM instruction manual title	Sound Level Meter	NL-42 / NL-52
SLM instruction manual ref / issue		11-03
SLM instruction manual source		Manufacturer
Internet download date if applicable		N/A
Case corrections available		Yes
Uncertainties of case corrections		Yes
Source of case data		Manufacturer
Wind screen corrections available		Yes
Uncertainties of wind screen corrections		Yes
Source of wind screen data		Manufacturer
Mic pressure to free field corrections		Yes
Uncertainties of Mic to F.F. corrections		Yes
Source of Mic to F.F. corrections		Manufacturer
Total expanded uncertainties within the requirements of IEC 61672-1:2002	Yes	
Specified or equivalent Calibrator		Specified
Customer or Lab Calibrator		Lab Calibrator
Calibrator adaptor type if applicable		NC-74-002
Calibrator cal. date		31 July 2019
Calibrator cert. number		UCRT19/1853
Calibrator cal cert issued by		0653
Calibrator SPL @ STP	93.99	dB Calibration reference sound pressure level
Calibrator frequency	1001.92	Hz Calibration check frequency
Reference level range	25 - 130	dB

Accessories used or corrected for during calibration - Extension Cable &amp; Wind Shield WS-15

Note - if a pre-amp extension cable is listed then it was used between the SLM and the pre-amp.

Environmental conditions during tests	Start	End	
Temperature	23.84	24.04	± 0.30 °C
Humidity	49.6	50.5	± 3.00 %RH
Ambient Pressure	100.42	100.41	± 0.03 kPa

Response to associated Calibrator at the environmental conditions above.

Initial indicated level	93.9	dB	Adjusted indicated level	94.0	dB
The uncertainty of the associated calibrator supplied with the sound level meter ±				0.10	dB

Self Generated Noise This test is currently not performed by this Lab.

Microphone installed (if requested by customer) = Less Than N/A dB A Weighting

Uncertainty of the microphone installed self generated noise ± N/A dB

Microphone replaced with electrical input device -	UR = Under Range indicated							
Weighting	A		C		Z			
	11.5	dB UR	15.4	dB UR	20.3	dB UR		

Uncertainty of the electrical self generated noise ± 0.12 dB

The reported expanded uncertainty is based on a standard uncertainty multiplied by a coverage factor  $k=2$ , providing a coverage probability of approximately 95%. The uncertainty evaluation has been carried out in accordance with UKAS requirements.

For the test of the frequency weightings as per paragraph 12. of IEC 61672-3:2006 the actual microphone free field response was used.

The acoustical frequency tests of a frequency weighting as per paragraph 11 of IEC 61672-3:2006 were carried out using an electrostatic actuator.

END

Calibrated by: B. Bogdan

R 2

Additional Comments

None