Appendix 9.2 Calibration Certificates of Monitoring Equipment							

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0653

Date of Issue: 05 April 2019

Issued by:

**ANV Measurement Systems** 

**Beaufort Court** 17 Roebuck Way

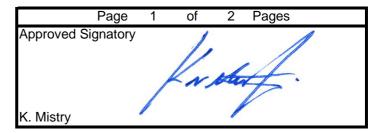
Milton Keynes MK5 8HL

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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

Certificate Number: UCRT19/1416



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** 23 January 2018 Dated

> UCRT18/1062 Certificate No.

0653 Laboratory

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Certificate Number UCRT19/1416

Page 2 of 2 Pages

UKAS Accredited Calibration Laboratory No. 0653

### 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  $\pm$  0.10 dB rel 20  $\mu$ Pa

### **Functional Tests and Observations**

The frequency of the sound produced was

1002.20 Hz

0.13 Hz

 $\pm$ 

The total distortion was

1.48 %

6.6 % of Reading

R 2

During the measurements environmental conditions were

Temperature 22 to 23  $^{\circ}$ C Relative Humidity 35 to 41  $^{\circ}$ 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





Date of Issue: 08 April 2019

Issued by:

**ANV Measurement Systems** 

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Acoustics Noise and Vibration Ltd trading as ANV Measurement Systems

Certificate Number: UCRT19/1437

Page 1 of Approved Signatory	2 Pages
Approved Signatory	
K. Mistry	v start.

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

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**Additional Comments** 

None

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 ± Humidity 43.0 3.00 %RH 41.2 ± 100.06 100.03 0.03 kPa Ambient Pressure 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 C 12.0 dΒ UR 16.4 dΒ UR 22.0 dΒ UR Uncertainty of the electrical self generated noise ± dΒ 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





Date of Issue: 12 August 2019

Issued by:

**ANV Measurement Systems** 

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Acoustics Noise and Vibration Ltd trading as ANV Measurement Systems

Certificate Number: UCRT19/1894

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

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Certificate Number UCRT19/1894

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UKAS Accredited Calibration Laboratory No. 0653

**Additional Comments** 

None

Sound Level Meter Instruc	ction manual and	d data used	d to adjust th	he soun	d levels	s indi	cated.			
SLM instruction manual title	Sound Level	Meter NL	-42 / NL-52							
SLM instruction manual ref /	issue	1	1-03							
SLM instruction manual sour	ce	Manu	ıfacturer							
Internet download date if app	olicable	1	N/A							
Case corrections available		\	/es							
Uncertainties of case correct	ions	•	res .							
Source of case data			ıfacturer							
Wind screen corrections available	ilable		Yes							
Uncertainties of wind screen	corrections	•	Yes .							
Source of wind screen data		Manu	ıfacturer							
Mic pressure to free field corr	rections	'	Yes							
Uncertainties of Mic to F.F. c	orrections	`	<b>Yes</b>							
Source of Mic to F.F. correcti	ions	Manu	ıfacturer							
Total expanded uncertainties	within the require	ements of IE	C 61672-1:2	002	Yes					
Specified or equivalent Calibi	rator		ecified							
Customer or Lab Calibrator			alibrator							
Calibrator adaptor type if app	licable	_	74-002							
Calibrator cal. date		31 Ju	ıly 2019							
Calibrator cert. number		UCRT	19/1853							
Calibrator cal cert issued by		0	653							
Calibrator SPL @ STP		93.99	9 dB	Calibra	ation ref	erenc	e sound	d press	sure le	vel
Calibrator frequency		1001.9	92 Hz		ation ch			•		
Reference level range		25 - 13					<u> </u>	<u>/</u>		
Accessories used or correcte	ed for during calib	ration -	Extension (	Cable & \	Wind Sh	nield V	VS-15			
Note - if a pre-amp extension	-									
Environmental conditions dur		Star		End		•				
	emperature	23.84		24.04		±	0.30 °	<u>, C</u>		
	umidity	49.6		50.5		_ <u>-</u>	3.00 %			
	nbient Pressure	100.4		100.41	-	_ <u>÷</u>	0.03 k			
<u> </u>	•					<u> </u>	0.00 k	та		
Response to associated Calil										
Initial indicated level		dB	Adjusted				94.0		dB .=	
The uncertainty of the associ					±		0.10		dB	
Self Generated Noise Th	nis test is currently	not perforn	ned by this La	ab.						
Microphone installed (if reque	ested by custome	r) = Less Tl	han	N/A	C	dB A	Weigh	ting		
Uncertainty of the microphon	e installed self ge	nerated nois	se ±	N/A	C	lΒ				
Microphone replaced with ele	ectrical input device	ce -	UR = Unde	r Range	indicate	ed				
Weighting	Α	•	C		Z					
11.5	dB UR	15.4	dB UR	20	.3 0	iΒ	UR			
Uncertainty of the electrical s	elf generated nois	se ±		0.12	C	βB	•			
The reported expanded unce	rtainty is based o	n a standard	d uncertainty	multiplie	d bv a c	overa	ge facto	or <i>k=</i> 2	. provi	dina
a coverage probability of app	•		•	•	-		-		•	-
UKAS requirements.	•		•							
For the test of the frequency	weightings as per	paragraph	12. of IEC 61	1672-3:20	006 the	actua	l microp	hone	free fie	eld
response was used.	1				IEO 24	070 -	0000			
The acoustical frequency tesusing an electrostatic actuator		weighting as	s per paragra	iph 11 of	IEC 61	b/2-3	:2006 w	ere ca	irried o	out
		E	:ND							
Calibrated by: B. Bogd	an									R 2





NC-74-002

Date of Issue: 05 March 2019

Issued by:

**ANV Measurement Systems** 

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Acoustics Noise and Vibration Ltd trading as ANV Measurement Systems

Certificate Number: UCRT19/1283

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 Instrument Manufacturer Type Serial No. / Version Sound Level Meter NL-52 Rion 00320643 Rion **Firmware** 2.0 Rion Pre Amplifier NH-25 10651 UC-59 Microphone 03392 Rion NC-74 Rion Calibrator 34536109

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.

Calibrator adaptor type if applicable

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 04 March 2019 ANV Job No. UKAS19/03143

Date Calibrated 05 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 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			
	15 March 2018	UCRT18/1297	0653			

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Certificate Number UCRT19/1283

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UKAS Accredited Calibration Laboratory No. 0653

None

Sound Level Meter Instr	uction manual and	d data used to ad	just th	e soun	d leve	ls ind	licated.			
SLM instruction manual titl	le Sound Level	Meter NL-42 / N	L-52							
SLM instruction manual re	f / issue	11-03								
SLM instruction manual so	ource	Manufacture	r							
Internet download date if a	ıpplicable	N/A								
Case corrections available		Yes								
Uncertainties of case corre	ections	Yes								
Source of case data		Manufacture	r							
Wind screen corrections a	vailable	Yes								
Uncertainties of wind scree	en corrections	Yes								
Source of wind screen data	a	Manufacture	r							
Mic pressure to free field of		Yes								
Uncertainties of Mic to F.F		Yes								
Source of Mic to F.F. corre		Manufacture								
Total expanded uncertaint			72-1:20	02	Yes					
Specified or equivalent Ca		Specified								
Customer or Lab Calibrato		Lab Calibrato	or							
Calibrator adaptor type if a	pplicable	NC-74-002								
Calibrator cal. date		28 February 20								
Calibrator cert. number		UCRT19/126	3							
Calibrator cal cert issued b	у	0653								
Calibrator SPL @ STP		93.98	dB	Calibra	ation re	eferen	ce sound	press	ure le	vel
Calibrator frequency		1001.93	Hz	Calibra	ation c	heck f	requency	,		
Reference level range		25 - 130	dB							
Accessories used or corre	cted for during calib	ration - Exten	sion C	able & \	Wind S	Shield	WS-15			
Note - if a pre-amp extens										
			1		arra arr	<u> </u>	ипр.			
Environmental conditions of		Start		End		_	0.40.90	$\overline{}$		
	Temperature	22.44		23.12		±	0.40 °C			
•	Humidity	37.2 99.12		39.2 99.18		±	3.00 %			
	Ambient Pressure				1	±	0.03 k	Pa		
Response to associated C	alibrator at the envir	onmental condition	s abov	e.						
Initial indicated level				ndicate			94.0	C	dΒ	
The uncertainty of the asso	ociated calibrator su	pplied with the sou	nd leve	el meter	±		0.10	C	dΒ	
Self Generated Noise	This test is currently	not performed by	this La	b.						
Microphone installed (if red				N/A		dB	A Weight	ing		
Uncertainty of the microph	one installed self ge	nerated noise ±		N/A		dB				
Microphone replaced with	electrical input devic	ce - UR =	Under	Range	indica	ted	Ī			
Weighting	Α Ι	C	0	I		7	<u>'                                    </u>			
14	.1 dB UR	18.0 dB	UR	23	3.3	dB	UR			
Uncertainty of the electrica	al self generated noi:			0.12		dB				
The reported expanded un	certainty is based o	n a standard uncer	tainty n	nultiplie	d by a	cover	= age facto	r k=2	provi	dina
a coverage probability of a	-		-	•	-		-		•	-
UKAS requirements.	pproximatory 0070.	The directionity of	araatio.	Triac b	0011 00		, at iii acc	J. danie	, , , , , , , , , , , , , , , , , , ,	•
For the test of the frequence	cv weightings as ner	r naragraph 12 of I	EC 616	372-3:20	006 th	actu	al microni	hone f	ree fie	기식
response was used.	by weightings as per	paragraph 12. of 1		312 3.2	000 1110	aciu	антпогорі	ione i	icc nc	,iu
•	casta of a fraguency	waighting as par pa	roaron	h 11 of	IEC 6	1670 (	2:2006 44	oro oo	rriad a	<del>4</del>
The acoustical frequency tusing an electrostatic actual		weigning as per pa	arayrap	<i>,</i> ,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,	IEC 0	1012-	J.∠UUU W€	sie Cal	meu 0	,ut
using an electrostatic actu	ator.	END								
O-19 (11		END								
Calibrated by: A Pate	<del>S</del> I									R 1
Additional Comments										