



財團法人全國認證基金會  
Taiwan Accreditation Foundation

# Certificate of Accreditation

(Certificate No : LN1001-240923)

This is to certify that

**National Measurement Laboratory, R. O. C.**  
**National Measurement Laboratory, R. O. C.(Acoustics & Vibration)**  
321 Kuang Fu Rd., Sec. 2, Hsinchu, Taiwan, R. O. C.

**is accredited in respect of laboratory**

**Accreditation Criteria** : ISO/IEC 17025:2017 ; CNS 17025:2018  
**Accreditation Number** : N1001  
**Originally Accredited** : January 01, 2003  
**Effective Period** : January 01, 2022 to December 31, 2026  
**Accredited Scope** : Calibration Field, see described in the Appendix  
**Specific Accreditation Program** : Accreditation Program for National Metrology Institutes



Scan to verify

*Yi-Ling Chen*

Yi-Ling Chen  
President, Taiwan Accreditation Foundation  
September 23, 2024

Accreditation Number : N1001

Laboratory Head : LAN, Yu-Ping

## Vibration &amp; Acoustics

calibration items	working standard	calibration method	measurand level or range				measurement conditions /independent variable	smallest uncertainty	
	brand /model	document name /no.	minimum value	units	maximum value	units	explanation	value	units
KB1001 accelerometer	B&K 8305 /B&K 2626/ PCB 080A200 /PCB 442A102	instrument calibration technique for accelerometer - comparison method (Document No.: 07-3-83-0038)		V/ (m/s <sup>2</sup> )		V/ (m/s <sup>2</sup> )	Voltage sensitivity: Frequency 50 Hz to 3 kHz, Frequency/Amplitude: (50 Hz, 100 Hz, 160 Hz, 200 Hz, 300 Hz, 400 Hz, 500 Hz, 600 Hz, 700 Hz, 800 Hz, 900 Hz, 1000 Hz, 1500 Hz, 2000 Hz, 3000 Hz) /100 m/s <sup>2</sup>	1.4	%
				V/ (m/s <sup>2</sup> )		V/ (m/s <sup>2</sup> )	Voltage sensitivity: Frequency 3 kHz (exclude) to 7 kHz, Frequency/Amplitude: (4000 Hz, 5000 Hz, 6000 Hz, 7000 Hz) /100 m/s <sup>2</sup>	3.4	%
				pC/ (m/s <sup>2</sup> )		pC/ (m/s <sup>2</sup> )	Charge sensitivity: Frequency/Amplitude: (100 Hz, 160 Hz) /100 m/s <sup>2</sup>	1.4	%
Approval Signatory: TSUEI, Kuang-Yih; CHEN, Jiun-Kai; TU, Tsung-Hsien									



calibration items	working standard	calibration method	measurand level or range				measurement conditions /independent variable	smallest uncertainty	
	brand /model	document name /no.	minimum value	units	maximum value	units	explanation	value	units
KB1001 accelerometer	Uniphase 1101 Laser Interferometer Module/ RENISHAW /RLU 10 Laser Interferometer Module	instrument calibration technique for accelerometer - sine-approximation method (Document No.: 07-3-90-0117)		V/ (m/s <sup>2</sup> )		V/ (m/s <sup>2</sup> )	Voltage sensitivity: Frequency 50 Hz to 5 kHz, Frequency/Amplitude: (50 Hz/14 m/s <sup>2</sup> ), (100 Hz/22 m/s <sup>2</sup> ), (160 Hz/28 m/s <sup>2</sup> ), (200 Hz/70 m/s <sup>2</sup> ), (300 Hz/70 m/s <sup>2</sup> ), (400 Hz/70 m/s <sup>2</sup> ), (500 Hz/70 m/s <sup>2</sup> ), (600 Hz/70 m/s <sup>2</sup> ), (700 Hz/70 m/s <sup>2</sup> ), (800 Hz/70 m/s <sup>2</sup> ), (900 Hz/70 m/s <sup>2</sup> ), (1000 Hz/70 m/s <sup>2</sup> ), (1500 Hz/70 m/s <sup>2</sup> ), (2000 Hz/70 m/s <sup>2</sup> ), (2500 Hz/70 m/s <sup>2</sup> ), (3000 Hz/99 m/s <sup>2</sup> ), (4000 Hz/99 m/s <sup>2</sup> ), (5000 Hz/99 m/s <sup>2</sup> )	0.76	%
				V/ (m/s <sup>2</sup> )		V/ (m/s <sup>2</sup> )	Voltage sensitivity: Frequency 5 kHz (exclude) to 10 kHz, Frequency/Amplitude: (6000 Hz/99 m/s <sup>2</sup> ), (7000 Hz/99 m/s <sup>2</sup> ), (10000 Hz/141 m/s <sup>2</sup> )	1.8	%



calibration items	working standard	calibration method	measurand level or range				measurement conditions /independent variable	smallest uncertainty	
	brand /model	document name /no.	minimum value	units	maximum value	units	explanation	value	units
KB1001 accelerometer	Uniphase 1101 Laser Interferometer Module/ RENISHAW /RLU 10 Laser Interferometer Module	instrument calibration technique for accelerometer - sine-approximation method (Document No.: 07-3-90-0117)		pC/ (m/s <sup>2</sup> )		pC/ (m/s <sup>2</sup> )	Charge sensitivity: Frequency 50 Hz to 5 kHz, Frequency/Amplitude: (50 Hz/14 m/s <sup>2</sup> ), (100 Hz/22 m/s <sup>2</sup> ), (160 Hz/28 m/s <sup>2</sup> ), (200 Hz/70 m/s <sup>2</sup> ), (300 Hz/70 m/s <sup>2</sup> ), (400 Hz/70 m/s <sup>2</sup> ), (500 Hz/70 m/s <sup>2</sup> ), (600 Hz/70 m/s <sup>2</sup> ), (700 Hz/70 m/s <sup>2</sup> ), (800 Hz/70 m/s <sup>2</sup> ), (900 Hz/70 m/s <sup>2</sup> ), (1000 Hz/70 m/s <sup>2</sup> ), (1500 Hz/70 m/s <sup>2</sup> ), (2000 Hz/70 m/s <sup>2</sup> ), (2500 Hz/70 m/s <sup>2</sup> ), (3000 Hz/99 m/s <sup>2</sup> ), (4000 Hz/99 m/s <sup>2</sup> ), (5000 Hz/99 m/s <sup>2</sup> )	0.8	%
				pC/ (m/s <sup>2</sup> )		pC/ (m/s <sup>2</sup> )	Charge sensitivity: Frequency 5 kHz (exclude) to 10 kHz, Frequency/Amplitude: (6000 Hz/99 m/s <sup>2</sup> ), (7000 Hz/99 m/s <sup>2</sup> ), (10000 Hz/141 m/s <sup>2</sup> )	1.8	%
Approval Signatory: TSUEI, Kuang-Yih; CHEN, Jiun-Kai; TU, Tsung-Hsien									
KB1001 accelerometer	Uniphase 1101 Laser Interferometer Module/ RENISHAW /RLU 10 Laser Interferometer Module	instrument calibration technique for accelerometer - fringe-counting method (Document No.: 07-3-83-0045)		V/ (m/s <sup>2</sup> )		V/ (m/s <sup>2</sup> )	Voltage sensitivity: Frequency 50 Hz to 700 Hz, Frequency/Amplitude: (50 Hz/14 m/s <sup>2</sup> ), (100 Hz/22 m/s <sup>2</sup> ), (160 Hz/28 m/s <sup>2</sup> ), (200 Hz/70 m/s <sup>2</sup> ), (300 Hz/70 m/s <sup>2</sup> ), (400 Hz/70 m/s <sup>2</sup> ), (500 Hz/70 m/s <sup>2</sup> ), (600 Hz/70 m/s <sup>2</sup> ), (700 Hz/70 m/s <sup>2</sup> )	0.44	%





calibration items	working standard	calibration method	measurand level or range				measurement conditions /independent variable	smallest uncertainty	
	brand /model	document name /no.	minimum value	units	maximum value	units	explanation	value	units
KB1001 accelerometer	Uniphase 1101 Laser Interferometer Module/ RENISHAW /RLU 10 Laser Interferometer Module	instrument calibration technique for accelerometer - fringe-counting method (Document No.: 07-3-83-0045)		pC/ (m/s <sup>2</sup> )		pC/ (m/s <sup>2</sup> )	Charge sensitivity: Frequency 50 Hz to 700 Hz, Frequency/Amplitude: (50 Hz/14 m/s <sup>2</sup> ), (100 Hz/22 m/s <sup>2</sup> ), (160 Hz/28 m/s <sup>2</sup> ), (200 Hz/70 m/s <sup>2</sup> ), (300 Hz/70 m/s <sup>2</sup> ), (400 Hz/70 m/s <sup>2</sup> ), (500 Hz/70 m/s <sup>2</sup> ), (600 Hz/70 m/s <sup>2</sup> ), (700 Hz/70 m/s <sup>2</sup> )	0.49	%
Approval Signatory: TSUEI, Kuang-Yih; CHEN, Jiun-Kai; TU, Tsung-Hsien									
KB1001 low frequency accelerometer	PCB 301M26/ 442A102	instrument calibration technique for low frequency accelerometer - comparison method (Document No.: 07-3-86-0085)		V/ (m/s <sup>2</sup> )		V/ (m/s <sup>2</sup> )	Voltage sensitivity: Frequency 0.5 Hz to 160 Hz, Frequency/Amplitude: (0.5 Hz/0.2 m/s <sup>2</sup> ), (0.6 Hz/0.5 m/s <sup>2</sup> ), (0.63 Hz/0.5 m/s <sup>2</sup> ), (0.7 Hz/0.5 m/s <sup>2</sup> ), (0.8 Hz/0.5 m/s <sup>2</sup> ), (0.9 Hz/0.5 m/s <sup>2</sup> ), (1 Hz/1 m/s <sup>2</sup> ), (1.25 Hz/1 m/s <sup>2</sup> ), (1.6 Hz/1 m/s <sup>2</sup> ), (2 Hz/1.5 m/s <sup>2</sup> ), (2.5 Hz/1.5 m/s <sup>2</sup> ), (3 Hz/3.5 m/s <sup>2</sup> ), (3.15 Hz/3.5 m/s <sup>2</sup> ), (4 Hz/5 m/s <sup>2</sup> ), (5 Hz/5 m/s <sup>2</sup> ), (6.3 Hz/5 m/s <sup>2</sup> ), (7 Hz/5 m/s <sup>2</sup> ), (8 Hz/5 m/s <sup>2</sup> ), (9 Hz/5 m/s <sup>2</sup> ), (10 Hz/5 m/s <sup>2</sup> ), (12.5 Hz/5 m/s <sup>2</sup> ), (15 Hz/5 m/s <sup>2</sup> ), (16 Hz/5 m/s <sup>2</sup> ), (20 Hz/5 m/s <sup>2</sup> ), (30 Hz/5 m/s <sup>2</sup> ), (31.5 Hz/5 m/s <sup>2</sup> ), (40 Hz/5 m/s <sup>2</sup> ), (50 Hz/5 m/s <sup>2</sup> ), (70 Hz/5 m/s <sup>2</sup> ), (80 Hz/5 m/s <sup>2</sup> ), (90 Hz/5 m/s <sup>2</sup> ), (100 Hz/5 m/s <sup>2</sup> ), (160 Hz/2 m/s <sup>2</sup> )	1.5	%
Approval Signatory: TSUEI, Kuang-Yih; CHEN, Jiun-Kai; TU, Tsung-Hsien									



calibration items	working standard brand /model	calibration method document name /no.	measurand level or range				measurement conditions /independent variable explanation	smallest uncertainty	
			minimum value	units	maximum value	units		value	units
KB1001 low frequency accelerometer	Laser Interferometer Module SIOS SL 02/1	instrument calibration technique for low frequency accelerometer - sine approximation method (Document No.: 07-3-87-0004)		V/ (m/s <sup>2</sup> )		V/ (m/s <sup>2</sup> )	Voltage sensitivity: Frequency 0.1 Hz, Frequency/Amplitude: (0.1 Hz/0.01 m/s <sup>2</sup> )	1.7	%
				V/ (m/s <sup>2</sup> )		V/ (m/s <sup>2</sup> )	Voltage sensitivity: Frequency 0.1 Hz (exclude) to 160 Hz (exclude), Frequency/Amplitude: (0.2 Hz/0.05 m/s <sup>2</sup> ), (0.315 Hz, 0.4 Hz, 0.5 Hz, 0.63 Hz) /0.1 m/s <sup>2</sup> , (0.5 Hz, 0.7 Hz, 0.8 Hz) /0.2 m/s <sup>2</sup> , (0.6 Hz, 0.63 Hz, 0.7 Hz, 0.8 Hz, 0.9 Hz, 1 Hz) /0.5 m/s <sup>2</sup> , (1 Hz, 1.25Hz, 1.6 Hz, 2 Hz) /1 m/s <sup>2</sup> , (2 Hz, 2.5 Hz) /1.5 m/s <sup>2</sup> , (2.5 Hz, 3.15 Hz) /2 m/s <sup>2</sup> , (3 Hz, 3.15 Hz) /3.5 m/s <sup>2</sup> , (4 Hz, 5 Hz, 6.3 Hz, 7 Hz, 8 Hz, 9 Hz, 10 Hz, 12 Hz, 12.5 Hz, 15 Hz, 16 Hz, 20 Hz, 30 Hz, 31.5 Hz, 40 Hz, 50 Hz, 63 Hz, 70 Hz, 80 Hz, 90 Hz, 100 Hz) /5 m/s <sup>2</sup>	1.3	%



calibration items	working standard	calibration method	measurand level or range				measurement conditions /independent variable	smallest uncertainty	
	brand /model	document name /no.	minimum value	units	maximum value	units	explanation	value	units
KB1001 low frequency accelerometer	Laser Interferometer Module SIOS SL 02/1	instrument calibration technique for low frequency accelerometer - sine approximation method (Document No.: 07-3-87-0004)		V/ (m/s <sup>2</sup> )		V/ (m/s <sup>2</sup> )	Voltage sensitivity: Frequency 160 Hz, Frequency/Amplitude: (160 Hz/2 m/s <sup>2</sup> ) (160 Hz/5 m/s <sup>2</sup> )	1.6	%
Approval Signatory: TSUEI, Kuang-Yih; CHEN, Jiun-Kai; TU, Tsung-Hsien									
KB1001 shock accelerometer	PCB 301A12/ PCB 482A21	instrument calibration technique for shock accelerometer - comparison method (Document No.: 07-3-76-0007)		V/ (m/s <sup>2</sup> )		V/ (m/s <sup>2</sup> )	Voltage sensitivity: Accerlation: 200 m/s <sup>2</sup> , 2000 m/s <sup>2</sup> , 6000 m/s <sup>2</sup> , 10000 m/s <sup>2</sup> , Shock duration 0.6 ms to 3.0 ms	1.9	%
Approval Signatory: TSUEI, Kuang-Yih; CHEN, Jiun-Kai; TU, Tsung-Hsien									
KB1001 shock accelerometer	REO/32734	instrument calibration technique for shock accelerometer - phase operation method (Document No.: 07-3-98-6157)		V/ (m/s <sup>2</sup> )		V/ (m/s <sup>2</sup> )	Voltage sensitivity: Accerlation: 200 m/s <sup>2</sup> , 1000 m/s <sup>2</sup> , 2000 m/s <sup>2</sup> , 3000 m/s <sup>2</sup> , 4000 m/s <sup>2</sup> , 5000 m/s <sup>2</sup> , 6000 m/s <sup>2</sup> , 8000 m/s <sup>2</sup> , 10000 m/s <sup>2</sup> , Shock duration 0.3 ms to 3.0 ms	0.8	%
				pC/ (m/s <sup>2</sup> )		pC/ (m/s <sup>2</sup> )	Charge sensitivity: Accerlation: 200 m/s <sup>2</sup> , 1000 m/s <sup>2</sup> , 2000 m/s <sup>2</sup> , 3000 m/s <sup>2</sup> , 4000 m/s <sup>2</sup> , 5000 m/s <sup>2</sup> , 6000 m/s <sup>2</sup> , 8000 m/s <sup>2</sup> , 10000 m/s <sup>2</sup> , Shock duration 0.3 ms to 3.0 ms	0.8	%
Approval Signatory: TSUEI, Kuang-Yih; CHEN, Jiun-Kai; TU, Tsung-Hsien									



calibration items	working standard	calibration method	measurand level or range				measurement conditions /independent variable	smallest uncertainty	
	brand /model	document name /no.	minimum value	units	maximum value	units	explanation	value	units
KB1002 low frequency vibration meter	PCB 301M26 /442A102/ Allied Signal QA-2000 /BKM 2601	instrument calibration technique for low frequency vibration meter - comparison method (Document No.: 07-3-86-0044)		m		m	Displacement: Frequency 3.15 Hz to 50 Hz, Frequency/Amplitude: (3.15 Hz/17.87 mm), (5 Hz/10.14 mm), (6.3 Hz/6.38 mm), (10 Hz/2.53 mm), (15 Hz/1.13 mm), (16 Hz/0.99 mm), (20 Hz/0.63 mm), (30 Hz/0.28 mm), (31.5 Hz/0.26 mm), (40 Hz/0.16 mm), (50 Hz/0.1 mm)	2.3	%
				m/s		m/s	Velocity: Frequency 3.15 Hz to 50 Hz, Frequency/Amplitude: (3.15 Hz/176.83 mm/s), (5 Hz/159.26 mm/s), (6.3 Hz/126.32 mm/s), (10 Hz/79.57 mm/s), (15 Hz/53.08 mm/s), (16 Hz/49.72 mm/s), (20 Hz/39.82 mm/s), (30 Hz/26.54 mm/s), (31.5 Hz/25.27 mm/s), (40 Hz/19.96 mm/s), (50 Hz/15.94 mm/s)	1.5	%
				m/s <sup>2</sup>		m/s <sup>2</sup>	Acceleration: Frequency 3.15 Hz to 50 Hz, Frequency/Amplitude: 3.15 Hz/3.5 m/s <sup>2</sup> , (5 Hz, 6.3 Hz, 10 Hz, 15 Hz, 16 Hz, 20 Hz, 30 Hz, 31.5 Hz, 40 Hz, 50 Hz) /5 m/s <sup>2</sup>	1.3	%
Approval Signatory: TSUEI, Kuang-Yih; CHEN, Jiun-Kai; TU, Tsung-Hsien									





calibration items	working standard	calibration method	measurand level or range				measurement conditions /independent variable	smallest uncertainty	
	brand /model	document name /no.	minimum value	units	maximum value	units	explanation	value	units
KB1002 vibration meter	PCB 080A200 /PCB 442A102/ B&K 8305 /B&K 2626	instrument calibration technique for vibration meter - comparison method (Document No.: 07-3-77-0030)		m/s <sup>2</sup>		m/s <sup>2</sup>	Acceleration: Frequency 50 Hz to 2 kHz, Frequency/Amplitude: (50 Hz, 100 Hz, 160 Hz, 200 Hz, 300 Hz, 400 Hz, 500 Hz, 600 Hz, 700 Hz, 800 Hz, 900 Hz, 1000 Hz, 1500 Hz, 2000 Hz) /100 m/s <sup>2</sup>	1.3	%
				m/s <sup>2</sup>		m/s <sup>2</sup>	Acceleration: Frequency 2 kHz (exclude) to 5 kHz, Frequency/Amplitude: (3000 Hz, 4000 Hz, 5000 Hz) /100 m/s <sup>2</sup>	2.6	%
				m/s		m/s	Velocity: Frequency 50 Hz to 2 kHz, Frequency/Amplitude: (50 Hz/318.12 mm/s), (100 Hz/159.09 mm/s), (160 Hz/99.45 mm/s), (200 Hz/79.50 mm/s), (300 Hz/52.80 mm/s), (400 Hz/39.70 mm/s), (500 Hz/31.70 mm/s), (600 Hz/26.50 mm/s), (700 Hz/22.70 mm/s), (800 Hz/19.90 mm/s), (900 Hz/17.68 mm/s), (1000 Hz/15.90 mm/s), (1500 Hz/10.61 mm/s), (2000 Hz/7.96 mm/s)	1.5	%



calibration items	working standard	calibration method	measurand level or range				measurement conditions /independent variable	smallest uncertainty	
	brand /model	document name /no.	minimum value	units	maximum value	units	explanation	value	units
KB1002 vibration meter	PCB 080A200 /PCB 442A102/ B&K 8305 /B&K 2626	instrument calibration technique for vibration meter - comparison method (Document No.: 07-3-77-0030)		m		m	Displacement: Frequency 50 Hz to 200 Hz, Frequency/Amplitude: (50 Hz/2.03 mm), (100 Hz/0.51 mm), (160 Hz/0.20 mm), (200 Hz/0.13 mm)	2.1	%
Approval Signatory: TSUEI, Kuang-Yih; CHEN, Jiun-Kai; TU, Tsung-Hsien									
KB1099 charge amplifier	HP 16383A	instrument calibration technique for charge amplifier (Document No.: 07-3-96-0230)		mV/pC		mV/pC	Frequency 10 Hz	1.2	%
				mV/pC		mV/pC	Frequency 10 Hz (exclude) to 10 kHz	0.10	%
Approval Signatory: TSUEI, Kuang-Yih; CHEN, Jiun-Kai; TU, Tsung-Hsien									
KB2001 microphone	B&K 4180	Instrument Calibration Technique for Pressure Sensitivity of Half-inch Laboratory Standard Microphone-Reciprocity Method (Document No.: 07-3-A8-0201)		dB (reference: 1 V/Pa)		dB (reference: 1 V/Pa)	LS2P: Frequency 10 Hz to 10 kHz (fulfilling IEC 61094-1 LS2aP, LS2F)	0.06	dB
				dB (reference: 1 V/Pa)		dB (reference: 1 V/Pa)	LS2P: Frequency 10 kHz (exclude) to 16 kHz (fulfilling IEC 61094-1 LS2aP, LS2F)	0.08	dB
				dB (reference: 1 V/Pa)		dB (reference: 1 V/Pa)	LS2P: Frequency 16 kHz (exclude) to 20 kHz (fulfilling IEC 61094-1 LS2aP, LS2F)	0.12	dB



calibration items	working standard	calibration method	measurand level or range				measurement conditions /independent variable	smallest uncertainty	
	brand /model	document name /no.	minimum value	units	maximum value	units	explanation	value	units
KB2001 microphone	B&K 4180	Instrument Calibration Technique for Pressure Sensitivity of Half-inch Laboratory Standard Microphone-Reciprocity Method (Document No.: 07-3-A8-0201)		dB (reference: 1 V/Pa)		dB (reference: 1 V/Pa)	LS2P: Frequency 20 kHz (exclude) to 25 kHz (fulfilling IEC 61094-1 LS2aP, LS2F)	0.20	dB
Approval Signatory: KUO, Shu-Fen; LO, Fang-Chun; TU, Tsung-Hsien									
KB2001 microphone	B&K 4160 /B&K 4180	instrument calibration technique for microphone free-field sensitivity - reciprocity method (Document No.: 07-3-A2-0205)		dB (reference: 1 V/Pa)		dB (reference: 1 V/Pa)	LS1P: Frequency 1 kHz to 10 kHz (fulfilling IEC 61094-1 LS1P)	0.16	dB
				dB (reference: 1 V/Pa)		dB (reference: 1 V/Pa)	LS2P: Frequency 1 kHz to 40 kHz (fulfilling IEC 61094-1, LS2aP, LS2F)	0.18	dB
Approval Signatory: KUO, Shu-Fen; LO, Fang-Chun; TU, Tsung-Hsien									
KB2001 microphone	B&K 4180	Instrument Calibration Technique for Microphone Free-Field Sensitivity Calibration System-comparison method (Document No.: 07-3-B0-0057)		dB (reference: 1 V/Pa)		dB (reference: 1 V/Pa)	LS2/WS2: Frequency 250 Hz to 800 Hz (fulfilling IEC 61094-1, LS2 and IEC 61094-4, WS2)	0.40	dB



calibration items	working standard	calibration method	measurand level or range				measurement conditions /independent variable	smallest uncertainty	
	brand /model	document name /no.	minimum value	units	maximum value	units	explanation	value	units
KB2001 microphone	B&K 4180	Instrument Calibration Technique for Microphone Free-Field Sensitivity Calibration System-comparison method (Document No.: 07-3-B0-0057)		dB (reference: 1 V/Pa)		dB (reference: 1 V/Pa)	LS2/WS2: Frequency 800 Hz (exclude) to 20 kHz (fulfilling IEC 61094-1, LS2 and IEC 61094-4, WS2)	0.45	dB
				dB (reference: 1 V/Pa)		dB (reference: 1 V/Pa)	LS2/WS2: Frequency 20 kHz (exclude) to 31.5 kHz (fulfilling IEC 61094-1, LS2 and IEC 61094-4, WS2)	0.55	dB
				dB (reference: 1 V/Pa)		dB (reference: 1 V/Pa)	LS2/WS2: Frequency 31.5 kHz (exclude) to 40 kHz (fulfilling IEC 61094-1, LS2 and IEC 61094-4, WS2)	0.70	dB
Approval Signatory: KUO, Shu-Fen; LO, Fang-Chun; TU, Tsung-Hsien									
KB2001 microphone	B&K 4160	instrument calibration technique for microphone sound pressure sensitivity - reciprocity method (Document No.: 07-3-83-0046)		dB (reference: 1 V/Pa)		dB (reference: 1 V/Pa)	LS1P: Frequency 20 Hz to 40 Hz (fulfilling IEC 61094-1 LS1P)	0.06	dB
				dB (reference: 1 V/Pa)		dB (reference: 1 V/Pa)	LS1P: Frequency 40 Hz (exclude) to 5 kHz (fulfilling IEC 61094-1 LS1P)	0.05	dB





calibration items	working standard	calibration method	measurand level or range				measurement conditions /independent variable	smallest uncertainty	
	brand /model	document name /no.	minimum value	units	maximum value	units	explanation	value	units
KB2001 microphone	B&K 4160	instrument calibration technique for microphone sound pressure sensitivity - reciprocity method (Document No.: 07-3-83-0046)		dB (reference: 1 V/Pa)		dB (reference: 1 V/Pa)	LS1P: Frequency 5 kHz (exclude) to 10 kHz (fulfilling IEC 61094-1 LS1P)	0.08	dB
				dB (reference: 1 V/Pa)		dB (reference: 1 V/Pa)	LS1P: Frequency 10 kHz (exclude) to 12.5 kHz (fulfilling IEC 61094-1 LS1P)	0.12	dB
Approval Signatory: KUO, Shu-Fen; LO, Fang-Chun; TU, Tsung-Hsien									
KB2001 microphone	B&K 4160 /B&K 4180	instrument calibration technique for microphone sound pressure sensitivity - comparison method (Document No.: 07-3-A5-0152)		dB (reference: 1 V/Pa)		dB (reference: 1 V/Pa)	Frequency 20 Hz to 40 Hz (fulfilling IEC 61094-1 LS1, IEC 61094-4 WS1)	0.12	dB
				dB (reference: 1 V/Pa)		dB (reference: 1 V/Pa)	Frequency 40 Hz (exclude) to 4 kHz (fulfilling IEC 61094-1 LS1, IEC 61094-4 WS1)	0.08	dB
				dB (reference: 1 V/Pa)		dB (reference: 1 V/Pa)	Frequency 4 kHz (exclude) to 8 kHz (fulfilling IEC 61094-1 LS1, IEC 61094-4 WS1)	0.12	dB
				dB (reference: 1 V/Pa)		dB (reference: 1 V/Pa)	Frequency 8 kHz (exclude) to 12.5 kHz (fulfilling IEC 61094-1 LS1, IEC 61094-4 WS1)	0.16	dB



calibration items	working standard brand /model	calibration method document name /no.	measurand level or range				measurement conditions /independent variable explanation	smallest uncertainty	
			minimum value	units	maximum value	units		value	units
KB2001 microphone	B&K 4160 /B&K 4180	instrument calibration technique for microphone sound pressure sensitivity - comparison method (Document No.: 07-3-A5-0152)		dB (reference: 1 V/Pa)		dB (reference: 1 V/Pa)	Frequency 20 Hz to 40 Hz (fulfilling IEC 61094-1LS2, IEC 61094-4 WS2)	0.12	dB
				dB (reference: 1 V/Pa)		dB (reference: 1 V/Pa)	Frequency 40 Hz (exclude) to 8 kHz (fulfilling IEC 61094-1LS2, IEC 61094-4 WS2)	0.08	dB
				dB (reference: 1 V/Pa)		dB (reference: 1 V/Pa)	Frequency 8 kHz (exclude) to 20 kHz (fulfilling IEC 61094-1LS2, IEC 61094-4 WS2)	0.16	dB
				dB (reference: 1 V/Pa)		dB (reference: 1 V/Pa)	Frequency 20 Hz to 40 Hz (fulfilling IEC 61094-4 WS3)	0.12	dB
				dB (reference: 1 V/Pa)		dB (reference: 1 V/Pa)	Frequency 40 Hz (exclude) to 6.3 kHz (fulfilling IEC 61094-4 WS3)	0.08	dB
				dB (reference: 1 V/Pa)		dB (reference: 1 V/Pa)	Frequency 6.3 kHz (exclude) to 16 kHz (fulfilling IEC 61094-4 WS3)	0.16	dB



calibration items	working standard	calibration method	measurand level or range				measurement conditions /independent variable	smallest uncertainty	
	brand /model	document name /no.	minimum value	units	maximum value	units	explanation	value	units
KB2001 microphone	B&K 4160 /B&K 4180	instrument calibration technique for microphone sound pressure sensitivity - comparison method (Document No.: 07-3-A5-0152)		dB (reference: 1 V/Pa)		dB (reference: 1 V/Pa)	Frequency 16 kHz (exclude) to 20 kHz (fulfilling IEC 61094-4 WS3)	0.24	dB
Approval Signatory: KUO, Shu-Fen; LO, Fang-Chun; TU, Tsung-Hsien									
KB2002 pistonphone	B&K 4144 (WS1P) / B&K 4134 (WS2P)	instrument calibration technique for sound calibrator - insert-voltage technique (Document No.: 07-3-83-0050)	90	dB (reference: 20 $\mu$ Pa)	130	dB (reference: 20 $\mu$ Pa)	Frequency 250 Hz	0.12	dB
Approval Signatory: KUO, Shu-Fen; LO, Fang-Chun; TU, Tsung-Hsien									
KB2002 pistonphone	B&K 4160 (LS1P) / B&K 4180 (LS2P) /	instrument calibration technique for sound calibrator - insert-voltage technique (Document No.: 07-3-83-0050)	90	dB (reference: 20 $\mu$ Pa)	130	dB (reference: 20 $\mu$ Pa)	Frequency 250 Hz	0.09	dB
Approval Signatory: KUO, Shu-Fen; LO, Fang-Chun; TU, Tsung-Hsien									



calibration items	working standard	calibration method	measurand level or range				measurement conditions /independent variable	smallest uncertainty	
	brand /model	document name /no.	minimum value	units	maximum value	units	explanation	value	units
KB2002 pistonphone	B&K 4228	instrument calibration technique for sound calibrator - comparison method (Document No.: 07-3-80-0027)	90	dB (reference: 20 $\mu$ Pa)	130	dB (reference: 20 $\mu$ Pa)	Frequency 250 Hz	0.15	dB
Approval Signatory: KUO, Shu-Fen; LO, Fang-Chun; TU, Tsung-Hsien									
KB2003 sound calibrator	B&K 4144 (WS1P) /B&K 4134 (WS2P)	instrument calibration technique for sound calibrator - insert-voltage technique (Document No.: 07-3-83-0050)	90	dB (reference: 20 $\mu$ Pa)	120	dB (reference: 20 $\mu$ Pa)	Sound calibrator: Frequency 1 kHz	0.12	dB
			90	dB (reference: 20 $\mu$ Pa)	120	dB (reference: 20 $\mu$ Pa)	Multi-frequency sound calibrator: Frequency 31.5 Hz	0.15	dB
			90	dB (reference: 20 $\mu$ Pa)	120	dB (reference: 20 $\mu$ Pa)	Multi-frequency sound calibrator: Frequency 63 Hz to 8 kHz	0.12	dB
			90	dB (reference: 20 $\mu$ Pa)	120	dB (reference: 20 $\mu$ Pa)	Multi-frequency sound calibrator: Frequency 12.5 kHz to 16 kHz	0.18	dB
Approval Signatory: KUO, Shu-Fen; LO, Fang-Chun; TU, Tsung-Hsien									
KB2003 sound calibrator	B&K 4160 (LS1P) /B&K 4180 (LS2P)	instrument calibration technique for sound calibrator - insert-voltage technique (Document No.: 07-3-83-0050)	90	dB (reference: 20 $\mu$ Pa)	120	dB (reference: 20 $\mu$ Pa)	Sound calibrator: Frequency 1 kHz	0.09	dB
			90	dB (reference: 20 $\mu$ Pa)	120	dB (reference: 20 $\mu$ Pa)	Multi-frequency sound calibrator: Frequency 31.5 Hz	0.09	dB
			90	dB (reference: 20 $\mu$ Pa)	120	dB (reference: 20 $\mu$ Pa)	Multi-frequency sound calibrator: Frequency 63 Hz to 8 kHz	0.09	dB





calibration items	working standard	calibration method	measurand level or range				measurement conditions /independent variable	smallest uncertainty	
	brand /model	document name /no.	minimum value	units	maximum value	units	explanation	value	units
KB2003 sound calibrator	B&K 4160 (LS1P) /B&K 4180 (LS2P)	instrument calibration technique for sound calibrator - insert-voltage technique (Document No.: 07-3-83-0050)	90	dB (reference: 20 $\mu$ Pa)	120	dB (reference: 20 $\mu$ Pa)	Multi-frequency sound calibrator: Frequency 12.5 kHz to 16 kHz	0.11	dB
Approval Signatory: KUO, Shu-Fen; LO, Fang-Chun; TU, Tsung-Hsien									
KB2003 sound calibrator	B&K 4231	instrument calibration technique for sound calibrator - comparison method (Document No.: 07-3-80-0027)	90	dB (reference: 20 $\mu$ Pa)	120	dB (reference: 20 $\mu$ Pa)	Frequency 1 kHz	0.15	dB
Approval Signatory: KUO, Shu-Fen; LO, Fang-Chun; TU, Tsung-Hsien									
KB2004 sound level meter	B&K 4228 /B&K 4231 /B&K 4226	instrument calibration technique for sound pressure level of sound level meter (Document No.: 07-3-97-0083)	124	dB (reference: 20 $\mu$ Pa)	124	dB (reference: 20 $\mu$ Pa)	Frequency 250 Hz	0.2	dB
			94	dB (reference: 20 $\mu$ Pa)	114	dB (reference: 20 $\mu$ Pa)	Frequency 31.5 Hz	0.3	dB
			94	dB (reference: 20 $\mu$ Pa)	114	dB (reference: 20 $\mu$ Pa)	Frequency 63 Hz to 1 kHz	0.3	dB
			94	dB (reference: 20 $\mu$ Pa)	114	dB (reference: 20 $\mu$ Pa)	Frequency 2 kHz to 4 kHz	0.3	dB
			94	dB (reference: 20 $\mu$ Pa)	114	dB (reference: 20 $\mu$ Pa)	Frequency 8 kHz	0.4	dB
			94	dB (reference: 20 $\mu$ Pa)	114	dB (reference: 20 $\mu$ Pa)	Frequency 12.5 kHz	0.5	dB
			94	dB (reference: 20 $\mu$ Pa)	114	dB (reference: 20 $\mu$ Pa)	Frequency 16 kHz	0.6	dB
Approval Signatory: KUO, Shu-Fen; LO, Fang-Chun; TU, Tsung-Hsien									

Note: Smallest uncertainty represents an expanded uncertainty using a coverage factor approximately 95 % level of confidence.  
(Null Below)

