

DQE Services Co.,Ltd.

32 Soi Ladprao-Wanghin 55, Ladprao-Wanghin Rd., Ladprao, Bangkok 10230

Phone : +66 (0)2 538 2054, Email : dqeservicesinfo@gmail.com

REPORT OF CALIBRATION

Certificate No. : SP23-007

Page 3 of 5

Calibration Results : Without adjustment

Photometric Accuracy :

Wavelength (nm.)	CRMs Values (Abs)	UUC Reading (Abs)	Correction (Abs)	Uncertainty (Abs)	Coverage factor k
420	0.0000	0.000	0.0000	0.0028	2.00
	0.5787	0.575	0.0037	0.0031	2.00
	1.0490	1.044	0.0050	0.0029	2.00
	2.1900	2.181	0.0090	0.0080	2.00
440	0.0000	0.000	0.0000	0.0028	2.00
	0.5607	0.558	0.0027	0.0034	2.00
	1.0247	1.021	0.0037	0.0035	2.00
	2.1229	2.115	0.0079	0.0081	2.00
465	0.0000	0.000	0.0000	0.0028	2.00
	0.5236	0.520	0.0036	0.0030	2.00
	0.9634	0.961	0.0024	0.0029	2.00
	1.9763	1.968	0.0083	0.0070	2.00
546.1	0.0000	0.000	0.0000	0.0028	2.00
	0.5191	0.518	0.0011	0.0031	2.00
	1.0003	1.000	0.0003	0.0033	2.00
	1.9987	1.993	0.0057	0.0084	2.00
590	0.0000	0.000	0.0000	0.0028	2.00
	0.5523	0.552	0.0003	0.0030	2.00
	1.0809	1.082	-0.0011	0.0030	2.00
	2.0391	2.031	0.0081	0.0080	2.00
635	0.0000	0.000	0.0000	0.0028	2.00
	0.5601	0.562	-0.0019	0.0032	2.00
	1.0512	1.052	-0.0008	0.0030	2.00
	1.9294	1.923	0.0064	0.0079	2.00

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FM-708-02 R01 1/11/2021

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REPORT OF CALIBRATION

Certificate No. : SP23-007

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Photometric Accuracy :

Wavelength (nm.)	CRMs Values (Abs)	UUC Reading (Abs)	Correction (Abs)	Uncertainty (Abs)	Coverage factor k
235	0.0000	0.000	0.0000	0.0050	2.00
	0.7478	0.743	0.0048	0.0057	2.00
257	0.0000	0.000	0.0000	0.0050	2.00
	0.8686	0.861	0.0076	0.0059	2.00
313	0.0000	0.000	0.0000	0.0050	2.00
	0.2912	0.291	0.0002	0.0051	2.00
350	0.0000	0.000	0.0000	0.0050	2.00
	0.6448	0.639	0.0058	0.0055	2.00

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REPORT OF CALIBRATION

Certificate No. : SP23-007

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Wavelength Accuracy :

CRMs Values (nm.)	UUC Reading (nm.)	Correction (nm.)	Uncertainty (nm.)	Coverage factor k
241.54	240.8	0.74	0.18	2.00
279.40	278.5	0.90	0.18	2.00
288.70	288.0	0.70	0.18	2.00
334.22	333.5	0.72	0.18	2.00
361.26	360.5	0.76	0.18	2.00
418.48	417.8	0.68	0.21	2.00
446.70	445.9	0.80	0.18	2.00
453.20	452.5	0.70	0.18	2.00
460.06	459.5	0.56	0.18	2.00
536.90	536.0	0.90	0.18	2.00
637.94	637.1	0.84	0.18	2.00
440.74	440.0	0.74	0.18	2.00
472.22	471.5	0.72	0.18	2.00
513.70	513.0	0.70	0.18	2.00
528.72	528.0	0.72	0.18	2.00
574.60	574.0	0.60	0.18	2.00
585.48	584.6	0.88	0.20	2.00
684.63	684.0	0.63	0.18	2.00
740.27	740.0	0.27	0.20	2.00
748.28	747.5	0.78	0.18	2.00
807.16	806.5	0.66	0.18	2.00
879.70	879.0	0.70	0.18	2.00

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Remark : - UUC = Unit Under Calibration

- N/A = Not Available

- The result expanded uncertainty of measurement U is stated as the standard uncertainty of measurement multiplied by the coverage factor k ,

which for a normal distribution corresponds to a coverage probability of approximately 95%

- \* Indicates non TISI accredited

- End of Certificate -

FM-708-02 R01 1/11/2021

TECHNOLOGY PROMOTION ASSOCIATION (THAILAND-JAPAN)  
CORPORATE SERVICES 3: EQUIPMENT CALIBRATION AND TESTING SERVICES  
534/4 PATTANAKARN ROAD SOI 18, SUANLUANG, SUANLUANG BANGKOK 10250  
TEL. 0-2717-3000-29 FAX. 0-2719-9484

Certificate of Calibration

Cert. No.: 23TM727

Page : 1 of 3

Equipment : Incubator

Manufacturer : Memmert

Model : IF 75

Serial No. : D317.0305

ID No. : UAE.MIC.022/2561

Submitted by : United Analyst and Engineering Consultant Co.,Ltd.  
3 Soi Udomsuk 41, Sukhumvit Road,  
Bangchak, Phrakhanong,  
Bangkok 10260

Location : Microbiology Laboratory (302)

Received Order : 27 April 2023

Calibration Date : 27 - 28 April 2023

Ambient Temperature : ( 26 ± 10 ) °C

Relative Humidity : ( 50 ± 30 ) %

Calibrated by : Tawatchai Pama

Approved by : 

Approved Signatory

( ) Pornthippa Tameyakul

(/ ) Malee Butkruea

( ) Suwit Imjai

Issue Date : 11 May 2023

The Uncertainties are for a confidence probability of approximately 95%

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Approval of the head of Corporate Services 3 : Equipment Calibration and Testing Services.

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FM-708-02 R01 1/11/2021





Equipment : Incubator  
Condition As-Received : Used Item  
Reference : 2304-0461OC-4  
Result of Calibration : ( \* ) Without Adjustment  
Function of UUC\* : Temperature Source  
Fresh air setting : Close

Cert. No.: 23TM727  
Page : 3 of 3

Calibration Point (°C)	UUC* Setting (°C)	UUC* Reading (°C)	Temperature stability (± °C)	Temperature uniformity (°C)	Overall Variation (°C)	Coverage Factor k
44.0	44.0	44.0	0.055	0.42	0.52	2

Calibration Point (°C)	Measured Temperature (°C)									Uncertainty (± °C)
	1	2	3	4	5	6	7	8	9 (ref.)	
44.0	43.993	44.061	44.107	44.073	44.067	44.067	43.938	43.687	44.060	0.30

Average\* : The average of 30 values in each position.

Temperature stability : One-half of the greatest maximum difference of measured temperature at any one sensor.

Temperature uniformity : The maximum difference of measured temperatures at any sensors and the measured temperature at the reference location which are observed at the same time or at as close an observation time as possible to determine the temperature pattern or homogeneity within the chamber under steady-state conditions.

Overall Variation : The Difference of the maximum and minimum measured temperatures throughout observation.

UUC\* : Unit Under Calibration

Note : The reported uncertainty of measurement was included stability and excluded uniformity .

The reported uncertainty of measurement was based on a standard uncertainty multiplied by a coverage factor  $k$ , providing a level of confidence of approximately 95 %.

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Equipment : Incubator  
Condition As-Received : Used Item  
Reference : 2304-0461OC-4

Cert. No.: 23TM727  
Page : 2 of 3

Procedure Used :-

Calibration were conducted using calibration procedure CP-OT02 according to direct measurement method with Data Acquisition which connected with Resistance Temperature Detector ( RTD ).  
The temperature scale used was based on ITS-90.

Condition of this result of calibration

1. Reference standard instrument:-

Instrument	Model	Serial No.	Cert. No.	Due Date
1 ) Data Acquisition	34972A	MY57013711	22LM93	02 Jul 2023

2. This certificate is valid only to the item calibrated on date and place of calibration.

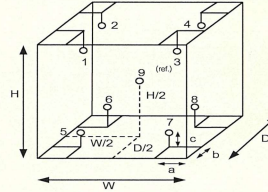
3. This certification is traceable to the International System of Unit.

Result of Calibration : ( \* ) Without Adjustment

Function of UUC\* : Temperature Source

Fresh air setting : Close

Environment during calibration		
	Beginning	Finished
Temp. ( °C )	25	24
REL.Humid. ( % )	76	80
AC Supply ( Volt )	231	231



Probe Installation Details :

a = 5.0 cm  
b = 5.0 cm  
c = 5.0 cm

Dimension of Chamber :

D = 0.33 m  
W = 0.40 m  
H = 0.56 m  
Capacity = 0.074 m<sup>3</sup>

Position :	Ref. Std. ID No.:
1	18-18RTD-01
2	18-18RTD-02
3	18-18RTD-03
4	18-18RTD-04
5	18-18RTD-05
6	18-18RTD-10
7	18-18RTD-07
8	22-18RTD-08
9 (ref.)	18-18RTD-09

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TECHNOLOGY PROMOTION ASSOCIATION (THAILAND-JAPAN)  
CORPORATE SERVICES 3: EQUIPMENT CALIBRATION AND TESTING SERVICES  
534/4 PATTANAKARN ROAD SOI 18, SUANLUANG, SUANLUANG BANGKOK 10250  
TEL. 0-2717-3000-29 FAX. 0-2719-9484



Cert. No.: 23TM728  
Page : 1 of 3

## Certificate of Calibration

Equipment : Incubator

Manufacturer : Memmert

Model : IPP 260

Serial No. : V616.0066

ID No. : UAE.MIC.032/2559

Submitted by : United Analyst and Engineering Consultant Co.,Ltd.  
3 Soi Udomsuk 41, Sukhumvit Road,  
Bangchak, Phrakhanong,  
Bangkok 10260

Location : Microbiology Laboratory (302)

Received Order : 27 April 2023

Calibration Date : 27 - 28 April 2023

Ambient Temperature : ( 26 ± 10 ) °C

Relative Humidity : ( 50 ± 30 ) %

Calibrated by : Tawatchai Pama

Approved by :

( ) Pornthippa Tameyakul

(✓) Malee Butkruea

( ) Suwit Imjai

Issue Date : 11 May 2023

The Uncertainties are for a confidence probability of approximately 95%

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Approval of the head of Corporate Services 3: Equipment Calibration and Testing Services.

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Equipment : Incubator  
Condition As-Received : Used Item  
Reference : 2304-0461OC-6  
Result of Calibration : ( \* ) Without Adjustment  
Function of UUC\* : Temperature Source  
Fresh air setting : Close

Cert. No.: 23TM728  
Page : 3 of 3

Calibration Point (°C)	UUC* Setting (°C)	UUC* Reading (°C)	Temperature stability (± °C)	Temperature uniformity (°C)	Overall Variation (°C)	Coverage Factor k
25.0	25.0	25.0	0.020	0.81	1.2	2
36.0	36.0	36.0	0.15	1.1	1.6	2

Calibration Point (°C)	Measured Temperature (°C)									Uncertainty (± °C)
	1	2	3	4	5	6	7	8	9 (ref.)	
25.0	25.541	25.354	25.388	25.278	24.341	24.349	24.379	24.455	24.747	0.30
36.0	35.275	35.351	35.768	35.941	36.543	36.590	36.653	36.728	36.232	0.39

Average\* : The average of 30 values in each position.

Temperature stability : One-half of the greatest maximum difference of measured temperature at any one sensor.

Temperature uniformity : The maximum difference of measured temperatures at any sensors and the measured temperature at the reference location which are observed at the same time or at as close an observation time as possible to determine the temperature pattern or homogeneity within the chamber under steady-state conditions.

Overall Variation : The Difference of the maximum and minimum measured temperatures throughout observation.

UUC\* : Unit Under Calibration

Note : The reported uncertainty of measurement was included stability and excluded uniformity .

The reported uncertainty of measurement was based on a standard uncertainty multiplied by a coverage factor  $k$ , providing a level of confidence of approximately 95 %.

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Equipment : Incubator  
Condition As-Received : Used Item  
Reference : 2304-0461OC-6

Cert. No.: 23TM728  
Page : 2 of 3

**Procedure Used :-**

Calibration were conducted using calibration procedure CP-OT02 according to direct measurement method with Data Acquisition which connected with Resistance Temperature Detector ( RTD ).  
The temperature scale used was based on ITS-90.

**Condition of this result of calibration**

1. Reference standard instrument:-

Instrument	Model	Serial No.	Cert. No.	Due Date
1 ) Data Acquisition	34972A	MY57013711	22LM93	02 Jul 2023

2. This certificate is valid only to the item calibrated on date and place of calibration.

3. This certification is traceable to the International System of Unit.

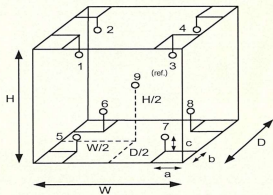
**Result of Calibration :-** ( \* ) Without Adjustment

**Function of UUC\* :** Temperature Source

**Fresh air setting :** Close

Environment during calibration		
	Beginning	Finished
Temp. ( °C )	25	22
REL.Humid. ( % )	76	83
AC Supply ( Volt )	231	231

Position :	Ref. Std. ID No.:
1	22-18RTD-2/1
2	18RTD-2/2
3	18RTD-2/3
4	18RTD-2/4
5	18RTD-2/5
6	18RTD-2/6
7	18RTD-2/7
8	18RTD-2/8
9 (ref.)	18RTD-2/9



**Probe Installation Details :**

**Dimension of Chamber :**

a = 10 cm  
b = 10 cm  
c = 10 cm  
D = 0.50 m  
W = 0.64 m  
H = 0.80 m  
Capacity = 0.26 m<sup>3</sup>

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TECHNOLOGY PROMOTION ASSOCIATION (THAILAND-JAPAN)  
CORPORATE SERVICES 3: EQUIPMENT CALIBRATION AND TESTING SERVICES  
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TEL: 0-2717-3000-29 FAX: 0-2719-9484



Cert. No.: 23TM193  
Page : 1 of 3

## Certificate of Calibration

Equipment : Water Bath

Manufacturer : Memmert

Model : WNE 14

Serial No. : L416.0606

ID No. : UAE.MIC.002/2560

Submitted by : United Analyst and Engineering Consultant Co.,Ltd.  
3 Soi Udomsuk 41, Sukhumvit Road,  
Bangchak, Phrakhanong,  
Bangkok 10260

Location : Microbiology Laboratory

Received Order : 15 February 2023

Calibration Date : 15 February 2023

Ambient Temperature : ( 26 ± 10 ) °C

Relative Humidity : ( 50 ± 30 ) %

Calibrated by : Suwit Imjai

Approved by :

Approved Signatory

( ) Pornthippa Tameyakul  
( / ) Malee Butkruea

Issue Date : 24 February 2023

The Uncertainties are for a confidence probability of approximately 95%

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Equipment : Water Bath  
Condition As-Received : Used Item  
Reference : 2302-0295OC-2

Cert. No.: 23TM193  
Page : 2 of 3

**Procedure Used :-**

Calibration were conducted using in-house calibration procedure CP-OT04 according to direct measurement method with Data Acquisition which connected with Industrial Platinum Resistance Thermometer ( IPRT ).

The temperature scale used was based on ITS-90.

**Condition of this result of calibration**

1. Reference standard instrument:-

Instrument	Model	Serial No.	Cert. No.	Due Date
1 ) Data Acquisition	34972A	MY59003411	22LM165	26 Nov 2023

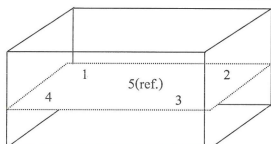
2. This certificate is valid only to the item calibrated on date and place of calibration.

3. This certification is traceable to the International System of Unit.

**Result of Calibration :-** ( \* ) Without Adjustment

**Function of UUC\* :** Temperature Source

	Environmental		AC Voltage Supply
	( °C )	( %R.H. )	( Volt )
Beginning of Calibration	22	65	231
Finished of Calibration	23	61	231



Front

Position :	Ref. Std. ID No.:
1	4804539-001
2	4804539-002
3	4804539-003
4	4804539-004
5(ref.)	4804539-005

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Equipment : Water Bath  
Condition As-Received : Used Item  
Reference : 2302-0295OC-2  
**Result of Calibration :-** ( \* ) Without Adjustment  
**Function of UUC\* :** Temperature Source

Cert. No.: 23TM193  
Page : 3 of 3

Calibration point ( °C )	UUC* Setting ( °C )	UUC* Reading ( °C )	Average* Standard Reading ( °C )				
			Position				
			1	2	3	4	5 (ref.)
44.5	44.5	44.5	44.453	44.437	44.428	44.477	44.459

Calibration point ( °C )	Uniformity ( °C )	Stability ( ± °C )	Uncertainty ( ± °C )	Coverage Factor k
44.5	0.079	0.038	0.15	2

**Average\* :** The average of 30 values in each position.

**Uniformity :** The maximum difference of measured temperatures at any sensors and the measured temperature at the reference location which are observed at the same time or at as close an observation time as possible to determine the temperature pattern or homogeneity within the chamber under steady-state conditions.

**Stability :** One-half of the greatest maximum difference of measured temperature at any one probe.

**UUC\* :** Unit Under Calibration

**Note :** The reported uncertainty of measurement was included stability and excluded uniformity.

The reported uncertainty of measurement was based on a standard uncertainty multiplied by a coverage factor *k*, providing a level of confidence of approximately 95 %.

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TECHNOLOGY PROMOTION ASSOCIATION (THAILAND-JAPAN)  
CORPORATE SERVICES 3: EQUIPMENT CALIBRATION AND TESTING SERVICES  
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TEL. 0-2717-3000-29 FAX. 0-2719-9484



Cert. No.: 23TM194  
Page : 1 of 3

## Certificate of Calibration

**Equipment :** Water Bath  
**Manufacturer :** Memmert  
**Model :** WNE 14  
**Serial No. :** L416.0612  
**ID No. :** UAE.MIC.003/2560  
**Submitted by :** United Analyst and Engineering Consultant Co.,Ltd.  
3 Soi Udomsuk 41, Sukhumvit Road,  
Bangchak, Phrakhanong,  
Bangkok 10260  
**Location :** Microbiology Laboratory  
**Received Order :** 15 February 2023  
**Calibration Date :** 15 February 2023  
**Ambient Temperature :** ( 26 ± 10 ) °C  
**Relative Humidity :** ( 50 ± 30 ) %  
**Calibrated by :** Suwit Imjai  
**Approved by :**   
( ) Pornthippa Tameyakul  
( ) Malee Bulkruea  
**Issue Date :** 24 February 2023

The Uncertainties are for a confidence probability of approximately 95%

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**Equipment :** Water Bath  
**Condition As-Received :** Used Item  
**Reference :** 2302-0295OC-3  
**Procedure Used :-**

Cert. No.: 23TM194  
Page : 2 of 3

Calibration were conducted using in-house calibration procedure CP-OT04 according to direct measurement method with Data Acquisition which connected with Industrial Platinum Resistance Thermometer ( IPRT ).

The temperature scale used was based on ITS-90.

### Condition of this result of calibration

1. Reference standard instrument:-

Instrument	Model	Serial No.	Cert. No.	Due Date
1 ) Data Acquisition	34972A	MY59003411	22LM165	26 Nov 2023

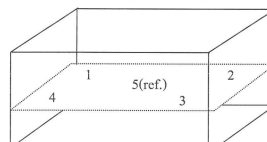
2. This certificate is valid only to the item calibrated on date and place of calibration.

3. This certification is traceable to the International System of Unit.

**Result of Calibration :-** ( \* ) Without Adjustment

**Function of UUC\* :** Temperature Source

	Environmental		AC Voltage Supply
	( °C )	( %R.H. )	( Volt )
Beginning of Calibration	22	65	231
Finished of Calibration	22	63	230



Front

Position :	Ref. Std. ID No.:
1	4804539-001
2	4804539-002
3	4804539-003
4	4804539-004
5(ref.)	4804539-005

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**Equipment :** Water Bath  
**Condition As-Received :** Used Item  
**Reference :** 2302-0295OC-3  
**Result of Calibration :-** ( \* ) Without Adjustment  
**Function of UUC\* :** Temperature Source

Cert. No.: 23TM194  
Page : 3 of 3

Calibration point ( °C )	UUC* Setting ( °C )	UUC* Reading ( °C )	Average* Standard Reading ( °C )				
			Position				
			1	2	3	4	5 (ref.)
44.5	44.5	44.6	44.520	44.509	44.498	44.552	44.530

Calibration point ( °C )	Uniformity ( °C )	Stability ( ± °C )	Uncertainty ( ± °C )	Coverage Factor k
44.5	0.077	0.037	0.15	2

**Average\* :** The average of 30 values in each position.

**Uniformity :** The maximum difference of measured temperatures at any sensors and the measured temperature at the reference location which are observed at the same time or at as close an observation time as possible to determine the temperature pattern or homogeneity within the chamber under steady-state conditions.

**Stability :** One-half of the greatest maximum difference of measured temperature at any one probe.

**UUC\* :** Unit Under Calibration

**Note :** The reported uncertainty of measurement was included stability and excluded uniformity.

The reported uncertainty of measurement was based on a standard uncertainty multiplied by a coverage factor *k*, providing a level of confidence of approximately 95 %.

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## Certificate of Calibration

**Equipment:** Balance  
**Model:** PX623  
**Serial No. (or ID.):** C236754745  
**Manufacturer:** Ohaus  
**Condition:** New

Certificate No.: C01223732  
Issued Date: 09 December 2022  
Job No.: KSPR2215576  
Page: 1 of 2

**Customer:** United Analyst and Engineering Consultant Co., Ltd.  
3 Soi Udomsuk 41, Sukhumvit Road, Bangchak Sub-District,  
Phrakhanong District, Bangkok, THAILAND 10260

**Environment Condition:** Temperature 26 °C ± 0.5 °C  
Humidity 53 %RH ± 3.9 %RH

**Calibration Place:** United Analyst and Engineering Consultant Co., Ltd. (301 Microbiology Room)  
3 Soi Udomsuk 41, Sukhumvit Road, Bangchak Sub-District,  
Phrakhanong District, Bangkok, THAILAND 10260

**Calibration By:** Mr. Adisai Maknoi  
**Calibration Date:** 09 December 2022

**The Method used:** In-house method, CAL-WI-47, based on UKAS Lab 14

**Traceability:** This certificate is traceable to the SI Units maintained by National Institute of Metrology (NIMT), Thailand through DKSH Technology Co., Ltd. Certificate No. C02221765

(Mr. Adisai Maknoi)

Person in charge

(Mr. Rungrod Jenkitrakulchai)

Authorized signatory

This certificate is issued the units of measurement according to the International System of Units (SI). It provides traceability of measurement to international or national standard or other recognized national standard laboratories.  
The measurement uncertainty stated is the expanded uncertainty which is obtained from the standard uncertainty multiplied by the coverage factor (*k*=2) to provide a level of confidence of approximately 95%. It is determined in accordance with the Guide to Expression of Uncertainty in Measurement (GUM).  
These results may be affected by deviations from specified conditions. The results relate only to the items tested, calibrated or sampled. The report shall not be reproduced except in full without approval of DKSH Technology Limited.

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2533 Sukhumvit Road, Bangchak, Phrakhanong, Bangkok 10260  
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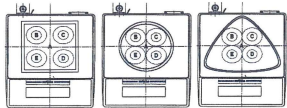
CAL-FM-C01-14: 12 Sep 2022



**Calibration Results:**

**Without Adjustment**

**Eccentric Error:** Weight to be 1/3 or 1/2 of Maximum capacity, taken from the center of the pan as a zero reference.



Nominal Test Value		200			(g)
Reference Points (g)					
A	B	C	D	E	
-	0.000	0.000	0.000	0.000	

**Repeatability:** Determination of the standard deviation of weighing balance., Readability 0.001 (g)

Nominal test value (g)	Standard Deviation
50	0.0004
500	0.0005

**Error of Indication from nominal or conventional mass value.,** Readability 0.001 (g)

Nominal Value (g)	Conventional Mass (g)	Displayed Value (g)	Error of Indication (g)	Uncertainty (g)	k
1	1.0000	1.000	0.000	0.0010	2.03
5	5.0001	5.000	0.000	0.0010	2.03
10	10.0001	10.000	0.000	0.0010	2.03
20	20.0001	20.000	0.000	0.0010	2.03
50	50.0001	50.000	0.000	0.0010	2.03
100	100.0001	100.000	0.000	0.0011	2.03
200	200.0004	200.000	0.000	0.0011	2.02
300	300.0005	300.000	-0.001	0.0013	2.01
400	400.0008	400.001	0.000	0.0014	2.01
500	500.0003	500.000	0.000	0.0017	2.00
600	600.0004	600.000	0.000	0.0019	2.00

The End of Certificate

**Statements of conformity:**

This conformity certificate documents the validity of the following statements of conformity based on the measurement results of corresponding calibration certificate:

The error of indication determined during calibration are under given measurement and environmental conditions and considering the expanded measurement uncertainty (coverage probability 95%) within the specification. The given measurement uncertainty already includes other all effects by according to the standard method, UKAS Lab14. Therefore, those parameters have not been assessed separately.

**Tolerance and Decision rules:**

Assessment of the conformity of the measurement device are done based on direct comparison of the relevant measurement results with the tolerances and decision rule are prescribed by the customer.

- Decision rule :**
- ☐ Choice A Binary Statement for Simple Acceptance Rule ( $w = 0$ ), Specific Risk < 50% PFA
  - ☒ Choice B Non-binary statement with guard band ( $w = 1$  U), Pass or Fail Specific Risk < 2.5% PFA and Condition Pass or Condition Fail Specific Risk < 50% PFA
  - ☐ Choice C Customer defined, Customers may define arbitrary multiple of  $r$  to have applied as guard band ( $w = r$  U) .
- ; PFA – Probability of False Accept

(Mr. Rungrod Jenkitrakulchai)  
Authorized signatory

**Statements of conformity:**

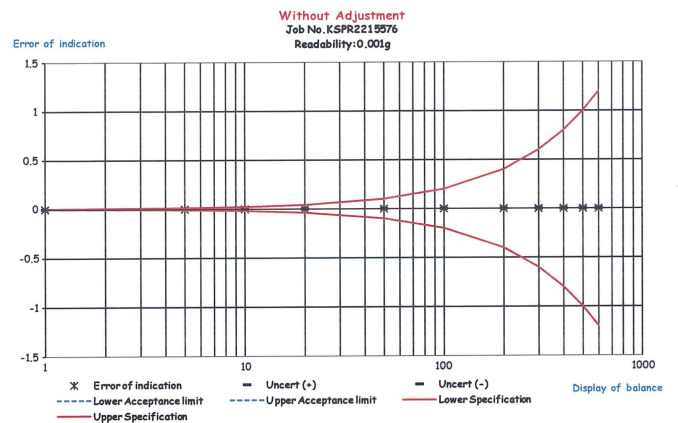
**Without Adjustment**

Readability; 0.001 g

Nominal Value g	Error of indication g	Guard band (w) g	Tolerance (±) g	Conformity
1	0.000	0.0010	0.002	Pass
5	0.000	0.0010	0.010	Pass
10	0.000	0.0010	0.020	Pass
20	0.000	0.0010	0.040	Pass
50	0.000	0.0010	0.100	Pass
100	0.000	0.0011	0.200	Pass
200	0.000	0.0011	0.400	Pass
300	-0.001	0.0013	0.600	Pass
400	0.000	0.0014	0.800	Pass
500	0.000	0.0017	1.000	Pass
600	0.000	0.0019	1.200	Pass

The validity of the statements of conformity cannot be guaranteed for different places of use, environmental conditions or improper use.

The End of Statements of conformity





Cert. No.: 23TM763  
Page : 1 of 3

## Certificate of Calibration

Equipment : Autoclave  
Manufacturer : ALP  
Model : CL-40L  
Serial No. : 808763  
ID No. : UAE.MIC.026/2563  
Submitted by : United Analyst and Engineering Consultant Co.,Ltd.  
3 Soi Udomsuk 41, Sukhumvit Road,  
Bangchak, Phrakhanong,  
Bangkok 10260  
Location : Microbiology Laboratory (301)  
Received Order : 27 April 2023  
Calibration Date : 27 April 2023  
Ambient Temperature : ( 26 ± 10 ) °C  
Relative Humidity : ( 50 ± 30 ) %  
Calibrated by : Preecha Hlahib  
Approved by :   
( ) Pornthippa Tameyakul  
(✓) Malee Butkruea  
( ) Suwit Imjai  
Issue Date : 11 May 2023

The Uncertainties are for a confidence probability of approximately 95%

This certificate may not be reproduced other than in full, except with the prior written  
Approval of the head of Corporate Services 3 : Equipment Calibration and Testing Services.

เอกสารไม่ควบคุม

A 0053944



Equipment : Autoclave  
Condition As-Received : Used Item  
Reference : 2304-0461OC-2  
Procedure Used :-

Cert. No.: 23TM763  
Page : 2 of 3

Calibration were conducted using in-house calibration procedure CP-OT03 according to direct measurement method with Data Acquisition which connected with Thermocouple Type T  
The temperature scale used was based on ITS-90.

### Condition of this result of calibration

1. Reference standard instrument:-

Instrument	Model	Serial No.	Cert. No.	Due Date
1 ) Data Acquisition	34972A	MY59003411	22LM165	26 Nov 2023

2. This certificate is valid only to the item calibrated on date and place of calibration.

3. This certification is traceable to the International System of Unit.

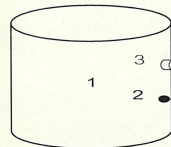
4. This result of calibration covers laboratory autoclaves for the sterilization of goods and material which could be infected with organisms categorized as Hazard Group 1, 2 and 3\*\*

(\*\* = Categorization of pathogens according to hazard and categories of containment, second edition, 1990 )  
It does not cover autoclaves for use with material infect with organisms in Hazard Group 4, for which complete containment and sterilization of infected condensate is considered to be essential.

This result of calibration does not apply to sterilizers or disinfectors used for medical, dental, pharmaceutical or veterinary purposes which are directly concerned with patient care, or those used for fabrics subjected to sterilization which are required to be dry at the end of cycle.

Result of Calibration :- ( \* ) Without Adjustment

Function of UUC\* : Temperature Source



	Environmental		
	( °C )	( %R.H. )	( Volt )
Beginning of Calibration	27	60	220
Finished of Calibration	27	58	220

Position	Description	Ref. Std. ID No.:
1 =	Center of chamber	18-20TC-04
2 =	Temperature sensor	18-20TC-05
3 =	Exhaust port	18-20TC-06

เอกสารไม่ควบคุม

a 1159968



Equipment : Autoclave  
Condition As-Received : Used Item  
Reference : 2304-0461OC-2  
Result of Calibration :- ( \* ) Without Adjustment  
Function of UUC\* : Temperature Source

Cert. No.: 23TM763  
Page : 3 of 3

Operating parameter Set : Temperature = 115.0 °C  
Sterilization period = 15 minute

UUC* Setting ( °C )	UUC* Reading ( °C )	Position	Average* Standard Reading ( °C )	Stability ( ± °C )	Pressure Reading ( MPa )	Uncertainty ( ± °C )	Coverage Factor k
115.0	115.0	1	115.213	0.22	0.08	0.75	2
		2	115.166				
		3	115.260				

Operating parameter Set : Temperature = 121.0 °C  
Sterilization period = 30 minute

UUC* Setting ( °C )	UUC* Reading ( °C )	Position	Average* Standard Reading ( °C )	Stability ( ± °C )	Pressure Reading ( MPa )	Uncertainty ( ± °C )	Coverage Factor k
121.0	121.0	1	121.260	0.29	1.1	0.75	2
		2	121.224				
		3	121.284				

Average\* : The average of 30 values in each position.

Stability : One-half of the greatest maximum difference of measured temperature at any one probe.

UUC\* : Unit Under Calibration

Note : The reported uncertainty of measurement was included stability and excluded uniformity .

The reported uncertainty of measurement was based on a standard uncertainty multiplied by a coverage factor k, providing a level of confidence of approximately 95 %.

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a 1159967



## List of Instruments Certification for Air & Noise Quality Analysis

No.	Instrument/Equipment	Parameter	Manufacturer	Model/Serial No.	Calibrator	Certification No.	Date of Calibration	Due date of Calibration	Remark
<b>Ambient</b>									
1	Orifice Transfer Standard Calibrator	Total Suspended Particulate (TSP) Particulate Matter < 10 µm (PM <sub>10</sub> )	Tisch Environmental, Inc.	TE-5025A 3540	Jiranatee Associates Co., Ltd.	CL-011-65	31 Oct 22	30 Oct 24	-
2	U-Tube Manometer	Total Suspended Particulate (TSP) Particulate Matter < 10 µm (PM <sub>10</sub> )	Dwyer	1221-36-W/M -	Technology Promotion Association (Thailand-Japan)	23P1402	9 May 23	8 May 24	-
3	Aneroid Barometer	Total Suspended Particulate (TSP) Particulate Matter < 10 µm (PM <sub>10</sub> )	Barigo, Germany	-	Technology Promotion Association (Thailand-Japan)	23P1857	2 Jun 23	1 Jun 24	-
4	Dial Thermo-Hygrometer	Total Suspended Particulate (TSP) Particulate Matter < 10 µm (PM <sub>10</sub> )	Barigo, Germany	-	Technology Promotion Association (Thailand-Japan)	23H1200	5 Jun 23	5 Jun 24	-
5	Nitrogen Dioxide Analyzer	Nitrogen Dioxide	Thermo Fisher Scientific	42C 0517512000	UAE Consultant Co., Ltd.	16032023	16 Mar 23	15 Mar 24	-
6	Nitrogen Dioxide Analyzer	Nitrogen Dioxide	Thermo Environmental Instrument	42C 42C-70971-367	UAE Consultant Co., Ltd.	16032023	16 Mar 23	15 Mar 24	-
7	Nitrogen Dioxide Analyzer	Nitrogen Dioxide	Thermo Environmental Instrument	42C 42C-78933-390	UAE Consultant Co., Ltd.	09022023	9 Feb 23	8 Feb 24	-
8	Standard Gases (Mixture)	Nitrogen Dioxide	Airgas	EB0143262 2015PSIG	Airgas an Air Liquide company	E04NI99E15A01D3	21 Jun 21	21 Jun 24	-
9	Carbon Monoxide Analyzer	Carbon Monoxide	Thermo	48i 1201497730	UAE Consultant Co., Ltd.	03042023	3 Apr 23	2 Apr 24	-
10	Carbon Monoxide Analyzer	Carbon Monoxide	Thermo	48i 1201497732	UAE Consultant Co., Ltd.	21022023	21 Feb 23	20 Feb 24	-
11	Carbon Monoxide Analyzer	Carbon Monoxide	Thermo	48i 1201778117	UAE Consultant Co., Ltd.	21022023	21 Feb 23	20 Feb 24	-
12	Standard Gases (Mixture)	Carbon Monoxide	Airgas	EB0143262 2015PSIG	Airgas an Air Liquide company	E04NI99E15A01D3	21 Jun 21	21 Jun 24	-

## List of Instruments Certification for Air & Noise Quality Analysis

No.	Instrument/Equipment	Parameter	Manufacturer	Model/Serial No.	Calibrator	Certification No.	Date of Calibration	Due date of Calibration	Remark
<b>Ambient</b>									
13	Sound Level Calibrator (Acoustic Calibrator)	Calibrate Sound Level Meter	Larson Davis	CAL150 6171	Innovative Instrument Co.,Ltd.	23-ACT-118	4 Aug 23	3 Aug 24	-
14	Sound Level Meter	$L_{Aeq\ 24\ hours}$ , $L_{Aeq\ 1\ hour}$ , $L_{Amax}$ , $L_{A90}$ , $L_{Adn}$	Larson Davis	LxT2 0006691	Larson Davis-A PCB Piezotronics Div.	2022003087	11 Mar 22	10 Mar 24	-
15	Sound Level Meter	$L_{Aeq\ 24\ hours}$ , $L_{Aeq\ 1\ hour}$ , $L_{Amax}$ , $L_{A90}$ , $L_{Adn}$	Larson Davis	LxT2 0006692	Larson Davis-A PCB Piezotronics Div.	2022003094	11 Mar 22	10 Mar 24	-
16	Sound Level Meter	$L_{Aeq\ 24\ hours}$ , $L_{Aeq\ 1\ hour}$ , $L_{Amax}$ , $L_{A90}$ , $L_{Adn}$	Larson Davis	LxT2 0006693	Larson Davis-A PCB Piezotronics Div.	2022002973	9 Mar 22	8 Mar 24	-



## CERTIFICATE OF CALIBRATION

Certificate No. : CL-011-65

Page 1 of 2 Pages

**MEASUREMENT ITEM** : Top Load Orifice  
**MANUFACTURER** : TISCH  
**MODEL/TYPE** : TE-5025A  
**SERIAL NUMBER** : 3540  
**ID NUMBER** : UAE.EFM.176/2561  
**CONDITION AS-RECEIVED** : Used item  
**CUSTOMER** : United Analyst and Engineering Consultant Co.,Ltd.  
81 Soi Udomsuk 41, Sukhumvit Road, Bangchak, Phrakhanong,  
Bangkok 10260

**Calibration procedure:**  
The Orifice gas flow device was calibrated against  
Standard Rotary Displacement Meter (Roots  
Meter) Model G65/IMC/V2-dp. The W1-CL-004  
was used as a calibration guideline.

**Traceability:**  
This certificate provides a traceability of The  
measurement to recognized the national  
standards and to realization of the international  
system of units (SI) through the VSL (National  
Metrology Institute of Netherlands) via Certificate  
number: G2211901

**Uncertainty of Measurement:**  
The reported uncertainty of measurement is based  
on the standard uncertainty multiplied by a  
coverage factor  $k=2$ , which for a normal  
distribution corresponds to a coverage probability  
of approximately 95%. The standard uncertainty  
has been determined in accordance with the GUM  
Evaluation of measurement  
data - Guide to the expression of uncertainty in  
measurement

**RECEIVED DATE** : 25 Oct 2022  
**MEASUREMENT DATE** : 31 Oct 2022  
**ISSUE DATE** : 02 Nov 2022

### ENVIRONMENTAL CONDITIONS:

Ambient condition in the laboratory are as follow:  
Temperature :  $23.0 \pm 3.0$  °C  
Relative Humidity :  $55.0 \pm 15.0$  %RH  
Atmospheric Pressure :  $1010 \pm 10$  hPa

### CALIBRATION CONDITION:

Preconditioning : 24 hours at ambient conditions.  
Measurement Condition : The average values during measurement are 24.5 °C and 61.0%RH.

### TABULATION OF RESULTS:

The table on next page give the measured values.

Calibrated by:  
☒ Mr. Sorawit Thachalad  
☐ Miss Jitraporn Lertsomphol



Approved signatory: \_\_\_\_\_  
Mr. Parinya Booncharoen  
Calibration Department Manager

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### MEASUREMENT RESULTS:

The Orifice gas flow device was calibrated by direct comparison method with the Standard Rotary Displacement Meter (Roots Meter). The Humid air was used as a medium in the system. The standard conditions are 25°C (298.15 K) and 760 mmHg for standard temperature and standard pressure respectively.

Table 1: The results of Q Standard calibration data

Plate	Flow rate m <sup>3</sup> /min	Pressure [Pa] mmHg	Temperature [Ta] °C	Temperature [Tm] °C	Δp_meter mmHg	Δp_Orifice inH <sub>2</sub> O	γ	Standard Flow [Q <sub>s</sub> ] m <sup>3</sup> /min
1	0.702	758.204	24.560	23.900	57.190	1.568	1.252	0.650
2	0.999	758.182	24.620	24.010	60.852	3.088	1.756	0.919
3	1.119	758.204	24.550	23.960	40.965	4.167	2.041	1.060
4	1.169	758.228	24.540	24.060	30.007	4.728	2.174	1.124
5	1.419	758.202	24.720	24.250	28.776	7.044	2.652	1.366

Slope (m): 1.96180  
Intercept (b): -0.03332  
Correlation coefficient (r): 0.99914  
Uncertainty (k=2): 0.017 m<sup>3</sup>/min

Table 2: The results of Q actual calibration data

Plate	Flow rate m <sup>3</sup> /min	Pressure [Pa] mmHg	Temperature [Ta] °C	Temperature [Tm] °C	Δp_meter mmHg	Δp_Orifice inH <sub>2</sub> O	γ	Standard Flow [Q <sub>s</sub> ] m <sup>3</sup> /min
1	0.702	758.204	24.560	23.900	57.190	1.568	0.785	0.651
2	0.999	758.182	24.620	24.010	60.852	3.088	1.101	0.920
3	1.119	758.204	24.550	23.960	40.965	4.167	1.279	1.060
4	1.169	758.228	24.540	24.060	30.007	4.728	1.362	1.124
5	1.419	758.202	24.720	24.250	28.776	7.044	1.664	1.368

Slope (m): 1.22877  
Intercept (b): -0.02091  
Correlation coefficient (r): 0.99914  
Uncertainty (k=2): 0.018 m<sup>3</sup>/min

\*\*\*End of Certificate of Calibration\*\*\*



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TECHNOLOGY PROMOTION ASSOCIATION (THAILAND-JAPAN)  
CORPORATE SERVICES 3: EQUIPMENT CALIBRATION AND TESTING SERVICES  
534/4 PATTANAKARN ROAD SOI 18, SUANLUANG, SUANLUANG, BANGKOK 10250  
TEL. 0-2717-3000-24 FAX. 0-2719-9484

## Certificate of Calibration

Certificate No. : 23P1402  
Page : 1 of 2

**Equipment** : U Tube Manometer  
**Manufacturer** : Dwyer  
**Model** : 1221-36-W/M  
**Serial No.** : -  
**ID No.** : UAE.EFM.180/2561  
**Condition As-Received** : Used item  
**Received Date** : 26 April 2023  
**Calibration Date** : 09 May 2023  
**Reference** : 2304-0703WSC  
**Ambient Temperature** : (  $23 \pm 2$  ) °C  
**Relative Humidity** : (  $50 \pm 15$  ) %  
**Atmospheric Pressure** : 1010 mbar  
**Submitted by** : United Analyst and Engineering Consultant Co.,Ltd.  
81 Soi Udomsuk 41, Sukhumvit Road, Bangchak,  
Phrakhanong, Bangkok 10260

**Procedure used** : The calibration was conducted by direct comparison method against Pressure Measuring Instruments  
Standard according to in-house calibration procedure CP-P04, using " DKD-R 6-1 " Calibration of Pressure  
Gauges, Edition 03/2014 " as a guidelines.

### Content of this result of calibration

1. Reference standards instruments :

Instrument	Model	Serial No.	Certificate No.	Due Date
1) Pressure Calibrator	PC106P	1189	MP-0137-22	24 Aug 2023

- This result of calibration was made on requested at the point specified by customer.
- Scale and conversion factor is 1 kPa = 4.0146293 inH<sub>2</sub>O
- This instrument was used clean air as pressure media.
- This instrument was calibrated by applied pressure to high-port (+) side and low-port (-) side open to atmospheric pressure.
- This instrument was installed in vertical orientation and top of the pressure port was used as the reference level.
- The certificate is valid only to the item calibrated on date and place of calibration.
- This Certification is traceable to the International System of Unit maintained through:-  
-National Institute of Metrology Thailand (NIMT)

Calibrated by : Suwit Ausarree  
Issue Date : 11 May 2023

Approved Signatory : \_\_\_\_\_  
[ ] Phalinee Prabpaipal  
[ ] Sura Suwannasri  
[x] Attapol Panurach

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B 0314242



Cert.No.: 23P1402  
Page: 2 of 2

**Result of calibration:- Without adjustment**  
**Function:- Pressure Measurement**  
**Increasing Pressure**

**Range:** 0 inH<sub>2</sub>O to 36 inH<sub>2</sub>O  
**Scale Interval:** 0.1 inH<sub>2</sub>O (The Fifth Estimate )

UUC Indication			ΔP (inH <sub>2</sub> O)	Error (inH <sub>2</sub> O)
Applied Pressure (inH <sub>2</sub> O)	High-port side (inH <sub>2</sub> O)	Low-port side (inH <sub>2</sub> O)		
0.00	0.00	0.00	0.00	0.00
2.00	1.00	-1.00	2.00	0.00
4.00	2.00	-2.00	4.00	0.00
6.00	3.00	-3.00	6.00	0.00
8.00	4.00	-4.00	8.00	0.00
10.00	5.00	-5.00	10.00	0.00
12.00	6.00	-6.00	12.00	0.00
14.00	7.00	-7.02	14.02	0.02
16.00	8.00	-8.02	16.02	0.02
18.00	9.02	-9.04	18.06	0.06
20.00	10.02	-10.04	20.06	0.06
22.00	11.00	-11.04	22.04	0.04
24.00	12.02	-12.06	24.08	0.08
26.00	13.02	-13.06	26.08	0.08
28.00	14.02	-14.04	28.06	0.06
30.00	15.02	-15.02	30.04	0.04
32.00	16.00	-16.02	32.02	0.02
34.00	17.00	-17.00	34.00	0.00
35.80	17.96	-17.98	35.94	0.14

The uncertainty of measurement was  $\pm 0.11$  inH<sub>2</sub>O

\* UUC = Unit Under Calibration

\* ΔP = High-port side - Low-port side

The reported uncertainty of measurement was based on a standard uncertainty multiplied  
by a coverage factor  $k=2$ , providing a level of confidence of approximately 95 %.

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a 1160343



## Certificate of Calibration

Certificate No. : 23P1857  
Page : 1 of 2

Equipment : Aneroid Barometer  
Manufacturer : Barigo  
Model : -  
Serial No. : -  
ID No. : UAE.ANV.151/2550

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Corporate Services 3: Equipment Calibration and Testing Services.

Condition As-Received: Used Item  
Received Date: 26 May 2023  
Calibration Date: 02 June 2023

Reference: 2305-0919WSC  
Ambient Temperature: ( 23 ± 2 ) °C  
Relative Humidity: ( 50 ± 15 ) %  
Atmospheric Pressure: 1007 mbar

Submitted by: United Analyst and Engineering Consultant Co.,Ltd.

81 Soi Udomsuk 41, Sukhumvit Road,  
Bangchak, Phrakhanong, Bangkok 10260

Procedure used: The calibration was conducted by direct comparison method against Pressure Measuring Instruments Standard according to in-house calibration procedure CP-P10, using \* DKD-R 6-1 ; Calibration of Pressure Gauges, Edition 03/2014 \* as a guidelines.

### Condition of this result of calibration

1.Reference standards instruments :

Instrument	Model	Serial No.	Certificate No.	Due Date
1) Standard Barometer	DPI142	1422505046	MP-0094-23	03 May 2024

2.This instrument was installed in vertical orientation and center of the dial was used as the reference level.

3.This result of calibration was made on requested at the point specified by customer.

4.This result of calibration instrument was in absolute pressure.

5.This instrument was used clean air as pressure media.

6.The certificate is valid only to the item calibrated on date and place of calibration.

7.This Certification is traceable to the International System of Unit maintained through:-

-National Institute of Metrology Thailand (NIMT)

Calibrated by : Suksan Khankaew  
Issue Date : 08 June 2023

Approved Signatory :

[ ] Phalinee Prabpaipal  
[ ] Sura Suwannasri  
[x] Attapol Panurach

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B 0316957



Cert.No.: 23P1857  
Page: 2 of 2

Result of calibration:- Without adjustment

Range: 960 hPa to 1030 hPa

Function:- Absolute Pressure Measurement

Scale Interval: 1 hPa ( The Fifth Estimate )

### Increasing Pressure

Applied Pressure (hPa)	960.27	971.66	982.37	994.32	1001.76	1010.97	1020.99	1030.52
UUC* Indication (hPa)	960.0	970.0	980.0	990.0	1000.0	1010.0	1020.0	1030.0
Error (hPa)	-0.27	-1.66	-2.37	-4.32	-1.76	-0.97	-0.99	-0.52

### Decreasing Pressure

Applied Pressure (hPa)	1030.52	1021.07	1011.30	1001.83	992.38	982.43	971.77	960.50
UUC* Indication (hPa)	1030.0	1020.0	1010.0	1000.0	990.0	980.0	970.0	960.0
Error (hPa)	-0.52	-1.07	-1.30	-1.83	-2.38	-2.43	-1.77	-0.50

The uncertainty of measurement was ± 0.30 hPa

\* UUC = Unit Under Calibration

The reported uncertainty of measurement was based on a standard uncertainty multiplied by a coverage factor k = 2, providing a level of confidence of approximately 95 %.

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a 1165501



## Certificate of Calibration

Certificate No. : 23H1200  
Page : 1 of 2

Equipment : Dial Thermo-Hygrometer  
Manufacturer : Barigo  
Model : -  
Serial No. : -  
ID No. : UAE.ANV.130/2550

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Corporate Services 3: Equipment Calibration and Testing Services.

Condition As-Received: Used Item  
Received Date: 26 May 2023  
Calibration Date: 30 May 2023

Reference: 2305-0919WSC  
Ambient Temperature: ( 25 ± 3 ) °C  
Relative Humidity: ( 50 ± 20 ) %

Submitted by: United Analyst and Engineering Consultant Co.,Ltd.

81 Soi Udomsuk 41, Sukhumvit Road,  
Bangchak, Phrakhanong, Bangkok 10260

Procedure used: Calibration were conducted using in-house calibration procedure CP-H02 according to comparison with standard chilled mirror sensor for humidity measurement function and comparison with standard temperature probe for temperature measurement function into humidity / temperature chamber.

### Condition of this result of calibration

1.Reference standards instruments :

Instrument	Model	Serial No.	Certificate No.	Due Date
1) Hygro-M2 Dew Point Monitor	5112	2360195	20703	02 Aug 2023
2) Handheld Thermometer With Sensor	1523	3240076	231305	15 Mar 2024

2.The certificate is valid only to the item calibrated on date and place of calibration.

3.This Certification is traceable to the International System of Unit maintained through:-

-National Institute of Standards and Technology (NIST) , The United States of America

-Technology Promotion Association (Thailand-Japan), NSC-ONSC Accredited No. Calibration 0008

Calibrated by : Somchal Dumwor  
Issue Date : 07 June 2023

Approved Signatory :

[x] Chakrit Waewwanjua  
[ ] Pornthippa Tameyakul  
[ ] Viporn Tantiyawutti

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B 0316274



Cert. No.: 23H1200  
Page: 2 of 2

Result of Calibration:-

Before Adjustment

Function:

Humidity Measurement

Reference Temperature (°C)	Standard Humidity (%R.H.)	UUC* Reading (%R.H.)	Error (%R.H.)	Uncertainty of Measurement (±%R.H.)
25.0	40.1	48	7.9	1.6
25.0	60.0	63	3.0	1.7
25.0	80.0	76	-4.0	1.9

Result of Calibration:-

After Adjustment

Function:

Humidity Measurement

Reference Temperature (°C)	Standard Humidity (%R.H.)	UUC* Reading (%R.H.)	Error (%R.H.)	Uncertainty of Measurement (±%R.H.)
25.0	40.1	44	3.9	1.6
25.0	60.0	60	0.0	1.7
25.0	80.0	75	-5.0	1.9

Result of Calibration:-

Without Adjustment

Function:

Temperature Measurement

Standard Temperature (°C)	UUC* Reading (°C)	Error (°C)	Uncertainty of Measurement (±°C)
19.987	20.0	0.013	0.72
30.016	30.0	-0.016	0.72
39.944	39.5	-0.444	0.72

UUC\* : Unit Under Calibration

The reported uncertainty of measurement was base on standard uncertainty multiplied by coverage factor k = 2.00, providing confidence level approximately 95%.

-00-

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### MULTI-POINT GAS TEST REPORT

Test Date : Mar 16, 2023

Equipment : Gas Analyzer (NO<sub>2</sub>) Model : 42C  
Manufacturer : Thermo Electron Corporation Serial Number : 0517512000

#### Standard Gas Concentration

Sulphur Dioxide (SO<sub>2</sub>) 44.68 PPM  
Nitric Oxide (NO) 45.94 PPM  
Methane (CH<sub>4</sub>) - PPM  
Carbon Monoxide (CO) 984.8 PPM  
Cylinder No. : EB0143262  
Expiration Date : Jun 21, 2024

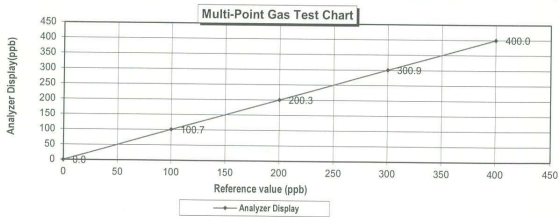
#### Dilutor Detail

Manufacturer : Thermo Scientific  
Model : 1461  
Serial Number : 1180540071

#### Multi-point gas test data

Level	Reference Value (ppb)	Analyzer Display (ppb)	Difference Error	Percent Error	[% Error]
Level 1	Zero	0.0	0.00	0.00	0.00
Level 2	20.00%	100.0	100.7	0.70	0.70
Level 3	40.00%	200.0	200.3	0.30	0.15
Level 4	60.00%	300.0	300.9	0.90	0.30
Level 5	80.00%	400.0	400.0	0.00	0.00

Remark : Measuring Range 500.0 ppb  
Acceptable Limit  $\pm 5\%$



16/3/23

16 Mar 2023

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### MULTI-POINT GAS TEST REPORT

Test Date : Mar 16, 2023

Equipment : Gas Analyzer (NO<sub>2</sub>) Model : 42C  
Manufacturer : Thermo Environmental Instruments Serial Number : 42C-70971-367

#### Standard Gas Concentration

Sulphur Dioxide (SO<sub>2</sub>) 44.68 PPM  
Nitric Oxide (NO) 45.94 PPM  
Methane (CH<sub>4</sub>) - PPM  
Carbon Monoxide (CO) 984.8 PPM  
Cylinder No. : EB0143262  
Expiration Date : Jun 21, 2024

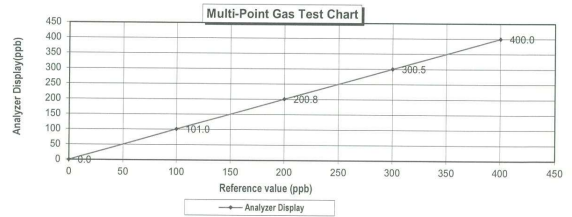
#### Dilutor Detail

Manufacturer : Thermo Scientific  
Model : 1461  
Serial Number : 1180540071

#### Multi-point gas test data

Level	Reference Value (ppb)	Analyzer Display (ppb)	Difference Error	Percent Error	[% Error]
Level 1	Zero	0.0	0.00	0.00	0.00
Level 2	20.00%	100.0	101.0	1.00	0.99
Level 3	40.00%	200.0	200.8	0.80	0.40
Level 4	60.00%	300.0	300.5	0.50	0.17
Level 5	80.00%	400.0	400.0	0.00	0.00

Remark : Measuring Range 500.0 ppb  
Acceptable Limit  $\pm 5\%$



16/3/23

16 Mar 2023

เอกสารไม่ควบคุม



### MULTI-POINT GAS TEST REPORT

Test Date : Feb 9, 2023

Equipment : Gas Analyzer (NO<sub>2</sub>) Model : 42C  
Manufacturer : Thermo Environmental Instruments Serial Number : 42C-78933-390

#### Standard Gas Concentration

Sulphur Dioxide (SO<sub>2</sub>) 44.68 PPM  
Nitric Oxide (NO) 45.94 PPM  
Methane (CH<sub>4</sub>) - PPM  
Carbon Monoxide (CO) 984.8 PPM  
Cylinder No. : EB0143262  
Expiration Date : Jun 21, 2024

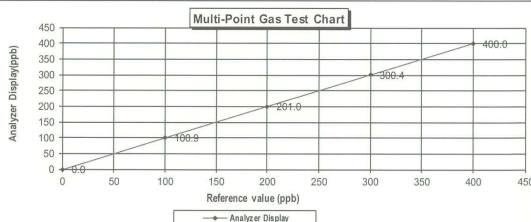
#### Dilutor Detail

Manufacturer : Thermo Scientific  
Model : 1461  
Serial Number : 1180540071

#### Multi-point gas test data

Level	Reference Value (ppb)	Analyzer Display (ppb)	Difference Error	Percent Error	[% Error]
Level 1	Zero	0.0	0.00	0.00	0.00
Level 2	20.00%	100.0	100.9	0.90	0.89
Level 3	40.00%	200.0	201.0	1.00	0.50
Level 4	60.00%	300.0	300.4	0.40	0.13
Level 5	80.00%	400.0	400.0	0.00	0.00

Remark : Measuring Range 500.0 ppb  
Acceptable Limit  $\pm 5\%$



Calculate by

9/2/23

9 Feb 2023

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### CERTIFICATE OF ANALYSIS Grade of Product: EPA Protocol

Part Number: E04NI99E15A01D3 Reference Number: 122-402135167-1  
Cylinder Number: EB0143262 Cylinder Volume: 144.4 CF  
Laboratory: 124 - Durham (SAP) - NC Cylinder Pressure: 2015 PSIG  
PGVP Number: B22021 Valve Outlet: 680  
Gas Code: CO,NO,NOX,SO<sub>2</sub>,BALN Certification Date: Jun 21, 2021

Expiration Date: Jun 21, 2024

Certification performed in accordance with "EPA Traceability Protocol for Assay and Certification of Gaseous Calibration Standards (May 2012)" document EPA 800R-12/531, using the assay procedures listed. Analytical Methodology does not require correction for analytical interference. This cylinder has a total analytical uncertainty as stated below with a confidence level of 95%. There are no significant impurities which affect the use of this calibration mixture. All concentrations are on a mole/mole basis unless otherwise noted.  
Do Not Use This Cylinder below 100 psig, i.e. 0.7 megapascals.

#### ANALYTICAL RESULTS

Component	Requested Concentration	Actual Concentration	Protocol Method	Total Relative Uncertainty	Assay Dates
NOX	45.00 PPM	45.96 PPM	G1	+/- 1.4% NIST Traceable	08/14/2021, 08/21/2021
NITRIC OXIDE	45.00 PPM	45.94 PPM	G1	+/- 1.4% NIST Traceable	08/14/2021, 08/21/2021
SULFUR DIOXIDE	45.00 PPM	44.88 PPM	G1	+/- 1.0% NIST Traceable	08/14/2021, 08/21/2021
CARBON MONOXIDE	1000 PPM	984.8 PPM	G1	+/- 0.7% NIST Traceable	08/14/2021
NITROGEN	Balance				

#### CALIBRATION STANDARDS

Type	Lot ID	Cylinder No	Concentration	Uncertainty	Expiration Date
NTRM	20061120	CC708068	49.82 PPM NITRIC OXIDE/NITROGEN	+/- 1.0%	Feb 02, 2025
PRM	12386	D85025	9.91 PPM NITROGEN DIOXIDE/AIR	+/- 2.0%	Feb 20, 2020
GMIS	401423838102	CC505581	4.348 PPM NITROGEN DIOXIDE/NITROGEN	+/- 2.1	Feb 18, 2023
NTRM	16011043	CC473277	49.02 PPM SULFUR DIOXIDE/NITROGEN	+/- 0.8%	Jun 17, 2022
NTRM	14060119	CC434277	990.9 PPM CARBON MONOXIDE/NITROGEN	+/- 0.6%	Nov 15, 2025

The SRM, PRM or RGM noted above is only in reference to the GMIS used in the assay and not part of the analysis.

#### ANALYTICAL EQUIPMENT

Instrument/Make/Model	Analytical Principle	Last Multipoint Calibration
Nicolet 6700 AHR0801333 CO	FTIR	Jun 03, 2021
Nicolet 6700 AHR0801333 NO	FTIR	Jun 03, 2021
Nicolet 6700 AHR0801333 NO <sub>2</sub>	FTIR	Jun 03, 2021
Nicolet 6700 AHR0801333 SO <sub>2</sub>	FTIR	Jun 03, 2021

Triad Data Available Upon Request

NOTES: PO #5221002807

GROSS WT: 28.40kg

NET WT: 4.73kg



The analytical test results reported on this certificate relate only to the cylinder number specified above. This concludes the test report.

Approved for Release



CERT 3082.01

เอกสารไม่ควบคุม

**MULTI-POINT GAS TEST REPORT**

Test Date : Apr 3, 2023

Equipment : Gas Analyzer (CO) Model : 48i  
Manufacturer : Thermo Scientific Serial Number : 1201497730

**Standard Gas Concentration**

Sulphur Dioxide (SO <sub>2</sub> )	44.68	PPM	Manufacturer :	Thermo Scientific
Nitric Oxide (NO)	45.94	PPM	Model :	146i
Methane (CH <sub>4</sub> )	-	PPM	Serial Number :	1180540071
Carbon Monoxide (CO)	984.8	PPM		
Cylinder No. :	EB0143262			
Expiration Date :	Jun 20, 2024			

**Dilutor Detail**

Multi-point gas test data

Level	Reference Value (ppm)	Analyzer Display (ppm)	Difference Error	Percent Error	[% Error ]
Level 1	Zero	0.0	0.0	0.0	0.0
Level 2	20.00%	10.0	10.9	0.9	8.3
Level 3	40.00%	20.0	20.5	0.5	2.4
Level 4	60.00%	30.0	30.6	0.6	2.0
Level 5	80.00%	40.0	40.0	0.0	0.0

Remark : Measuring Range 50.0 ppm Average Difference (%) 2.53  
:Acceptable Limit  $\pm 5\%$

**Multi-Point Gas Test Chart**

Calculate by : 3, 04, 66  
4, Apr, 2023

Page 1 of 1

เอกสารไม่ควบคุม

**MULTI-POINT GAS TEST REPORT**

Test Date : Feb 21, 2023

Equipment : Gas Analyzer (CO) Model : 48i  
Manufacturer : Thermo Scientific Serial Number : 1201497732

**Standard Gas Concentration**

Sulphur Dioxide (SO <sub>2</sub> )	44.68	PPM	Manufacturer :	Thermo Scientific
Nitric Oxide (NO)	45.94	PPM	Model :	146i
Methane (CH <sub>4</sub> )	-	PPM	Serial Number :	1180540071
Carbon Monoxide (CO)	984.8	PPM		
Cylinder No. :	EB0143262			
Expiration Date :	Jun 20, 2024			

**Dilutor Detail**

Multi-point gas test data

Level	Reference Value (ppm)	Analyzer Display (ppm)	Difference Error	Percent Error	[% Error ]
Level 1	Zero	0.0	0.0	0.0	0.0
Level 2	20.00%	10.0	10.5	0.5	4.8
Level 3	40.00%	20.0	20.7	0.7	3.4
Level 4	60.00%	30.0	30.7	0.7	2.3
Level 5	80.00%	40.0	40.0	0.0	0.0

Remark : Measuring Range 50.0 ppm Average Difference (%) 2.08  
:Acceptable Limit  $\pm 5\%$

**Multi-Point Gas Test Chart**

Calculate by : 91, 09, 66  
22, Feb, 2023

Page 1 of 1

เอกสารไม่ควบคุม

**MULTI-POINT GAS TEST REPORT**

Test Date : Feb 21, 2023

Equipment : Gas Analyzer (CO) Model : 48i  
Manufacturer : Thermo Scientific Serial Number : 1201778117

**Standard Gas Concentration**

Sulphur Dioxide (SO <sub>2</sub> )	44.68	PPM	Manufacturer :	Thermo Scientific
Nitric Oxide (NO)	45.94	PPM	Model :	146i
Methane (CH <sub>4</sub> )	-	PPM	Serial Number :	1180540071
Carbon Monoxide (CO)	984.8	PPM		
Cylinder No. :	EB0143262			
Expiration Date :	Jun 20, 2024			

**Dilutor Detail**

Multi-point gas test data

Level	Reference Value (ppm)	Analyzer Display (ppm)	Difference Error	Percent Error	[% Error ]
Level 1	Zero	0.0	0.0	0.0	0.0
Level 2	20.00%	10.0	10.3	0.3	2.9
Level 3	40.00%	20.0	20.7	0.7	3.4
Level 4	60.00%	30.0	30.9	0.9	2.9
Level 5	80.00%	40.0	40.0	0.0	0.0

Remark : Measuring Range 50.0 ppm Average Difference (%) 1.84  
:Acceptable Limit  $\pm 5\%$

**Multi-Point Gas Test Chart**

Calculate by : 91, 09, 66  
22, Feb, 2023

Page 1 of 1

เอกสารไม่ควบคุม

## CERTIFICATE OF ANALYSIS

### Grade of Product: EPA Protocol

Part Number: E04NI99E15A01D3 Reference Number: 122-402135167-1  
Cylinder Number: EB0143262 Cylinder Volume: 144.4 CF  
Laboratory: 124 - Durham (SAP) - NC Cylinder Pressure: 2015 PSIG  
PGVP Number: B22021 Valve Outlet: 680  
Gas Code: CO,NO,NOX,SO2,BALN Certification Date: Jun 21, 2021

Expiration Date: Jun 21, 2024

Certification performed in accordance with "EPA Traceability Protocol for Assay and Certification of Gaseous Calibration Standards (May 2012)" document EPA 800R-12/531, using the assay procedures listed. Analytical Methodology does not require correction for analytical interference. This cylinder has a total analytical uncertainty as stated below with a confidence level of 95%. There are no significant impurities which affect the use of this calibration mixture. All concentrations are on a mole/mole basis unless otherwise noted.  
Do Not Use This Cylinder below 100 psig, i.e. 0.7 megapascals.

ANALYTICAL RESULTS					
Component	Requested Concentration	Actual Concentration	Protocol Method	Total Relative Uncertainty	Assay Dates
NOX	45.00 PPM	45.96 PPM	G1	+/- 1.4% NIST Traceable	08/14/2021, 06/21/2021
NITRIC OXIDE	45.00 PPM	45.94 PPM	G1	+/- 1.4% NIST Traceable	08/14/2021, 06/21/2021
SULFUR DIOXIDE	45.00 PPM	44.98 PPM	G1	+/- 1.0% NIST Traceable	08/14/2021, 06/21/2021
CARBON MONOXIDE	1000 PPM	984.8 PPM	G1	+/- 0.7% NIST Traceable	08/14/2021
NITROGEN	Balance				

CALIBRATION STANDARDS				
Type	Lot ID	Cylinder No	Concentration	Uncertainty
NTRM	20061120	CC708068	49.82 PPM NITRIC OXIDE/NITROGEN	+/- 1.0%
PRM	12386	D85025	9.91 PPM NITROGEN DIOXIDE/AIR	+/- 2.0%
GMIS	401423838102	CC505581	4.348 PPM NITROGEN DIOXIDE/NITROGEN	+/- 2.1
NTRM	16011043	CC473277	49.02 PPM SULFUR DIOXIDE/NITROGEN	+/- 0.8%
NTRM	14060119	CC434277	990.9 PPM CARBON MONOXIDE/NITROGEN	+/- 0.6%

Triad Data Available Upon Request

NOTES: PO #5221002807  
GROSS WT: 28.40kg  
NET WT: 4.73kg



The analytical test results reported on this certificate relate only to the cylinder number specified above. This concludes the test report.

Approved for Release



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## Acoustic Signal Tests, C-weighting

Measured according to IEC 61672-3:2013 12 and ANSI S1.4-2014 Part 3: 12 using a comparison coupler with Unit Under Test (UUT) and reference SLM using slow time-weighted sound level for compliance to IEC 61672-1:2013 5.5; ANSI S1.4-2014 Part 1: 5.5

Frequency [Hz]	Test Result [dB]	Expected [dB]	Lower Limit [dB]	Upper Limit [dB]	Expanded Uncertainty [dB]	Result
125	-0.24	-0.20	-1.70	1.30	0.23	Pass
1000	0.17	0.00	-1.00	1.00	0.23	Pass
8000	-2.35	-3.00	-8.00	2.00	0.32	Pass

-- End of measurement results--

## Self-generated Noise

Measured according to IEC 61672-3:2013 11.1 and ANSI S1.4-2014 Part 3: 11.1

Measurement	Test Result [dB]
A-weighted	40.82

-- End of measurement results--

-- End of Report--

Signatory: [REDACTED]

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1681 West 820 North  
Provo, UT 84601, United States  
716-684-0001



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**LARSON DAVIS**  
A PCB DIVISION

D0001.8406 Rev F

2022-3-11T12:18:24

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Certificate Number 2022002970

Description	Standards Used
Hart Scientific 2626-H Temperature Probe	Cal Date 2021-02-04 Cal Due 2022-08-04 006767
SRS DS360 Ultra Low Distortion Generator	2022-01-03 2023-01-03 007118

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**LARSON DAVIS**  
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D0001.8407 Rev F

2022-3-11T12:08:57

เอกสารไม่ควบคุม

## Calibration Certificate

Certificate Number 2022002970

Customer:

United Analyst and Engineering Consultant Co Ltd  
No. 81 Soi Udonsuk 41, Sukhumvit Road, Bangkok, Phra  
Khanong, Bangkok, 10260, Thailand

Model Number LxT2  
Serial Number 0006891  
Test Results Pass

Initial Condition As Manufactured  
Description SoundTrack LxT Class 2  
Class 2 Sound Level Meter  
Firmware Revision: 2.404

Procedure Number D0001.8378  
Technician Jacob Cannon  
Calibration Date 9 Mar 2022  
Calibration Due  
Temperature 24 °C ± 0.25 °C  
Humidity 51.7 %RH ± 2.0 %RH  
Static Pressure 85.34 kPa ± 0.13 kPa

Evaluation Method Tested electrically using Larson Davis PRLxT2C S/N 071560 and a 12.0 pF capacitor to simulate microphone capacitance. Data reported in dB re 20 µPa assuming a microphone sensitivity of 50.0 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 2	ANSI S1.4-2014 Class 2
IEC 60804:2000 Type 2	ANSI S1.4 (R2006) Type 2
IEC 61252:2002	ANSI S1.25 (R2007)
IEC 61672:2013 Class 2	ANSI S1.43 (R2007) Type 2
IEC 61260:2001 Class 2	ANSI S1.11 (R2009) Class 2

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.

This report may not be reproduced, except in full, unless permission for the publication of an approved abstract is obtained in writing from the organization issuing this report.

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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716-684-0001



Page 1 of 8

**LARSON DAVIS**  
A PCB DIVISION

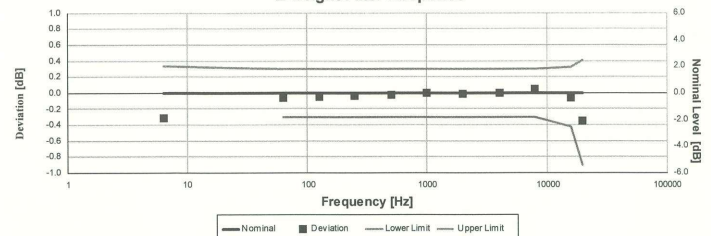
D0001.8407 Rev F

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เอกสารไม่ควบคุม

Certificate Number 2022002970

## Z-weight Filter Response



Electrical signal test of frequency weighting performed according to IEC 61672-3:2013 13 and ANSI S1.4-2014 Part 3: 13 for compliance to IEC 61672-1:2013 5.5; IEC 60651:2001 6.1 and 9.2.2; IEC 60804:2000 5; ANSI S1.4:1983 (R2006) 5.1 and 8.2.1; ANSI S1.4-2014 Part 1: 5.5

Frequency [Hz]	Test Result [dB]	Deviation [dB]	Lower Limit [dB]	Upper Limit [dB]	Expanded Uncertainty [dB]	Result
6.31	-0.31	-0.31	-1.11	0.33	0.15	Pass
63.10	-0.07	-0.07	-0.30	0.30	0.15	Pass
125.89	-0.05	-0.05	-0.30	0.30	0.15	Pass
251.19	-0.04	-0.04	-0.30	0.30	0.15	Pass
501.19	-0.02	-0.02	-0.30	0.30	0.15	Pass
1,000.00	0.00	0.00	-0.30	0.30	0.15	Pass
1,995.26	-0.02	-0.02	-0.30	0.30	0.15	Pass
3,981.07	0.00	0.00	-0.30	0.30	0.15	Pass
7,943.28	0.04	0.04	-0.30	0.30	0.15	Pass
15,848.93	-0.06	-0.06	-0.42	0.32	0.15	Pass
19,952.62	-0.35	-0.35	-0.91	0.41	0.15	Pass

-- End of measurement results--



Page 3 of 8

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716-684-0001

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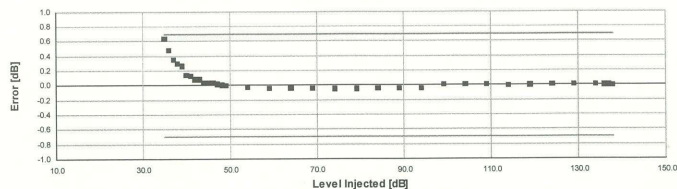
D0001.8407 Rev F

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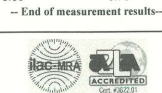


## A-weighted Broadband Log Linearity: 8,000.00 Hz



Broadband level linearity performed according to IEC 61672-3:2013 16 and ANSI S1.4-2014 Part 3: 16 for compliance to IEC 61672-1:2013 5.6, IEC 60804-2000 6.2, IEC 61252-2002 8, ANSI S1.4 (R2006) 6.9, ANSI S1.4-2014 Part 1: 5.6, ANSI S1.43 (R2007) 6.2

Level [dB]	Error [dB]	Lower limit [dB]	Upper limit [dB]	Expanded Uncertainty [dB]	Result
35.00	0.64	-0.70	0.70	0.16	Pass
36.00	0.49	-0.70	0.70	0.16	Pass
37.00	0.35	-0.70	0.70	0.16	Pass
38.00	0.30	-0.70	0.70	0.16	Pass
39.00	0.27	-0.70	0.70	0.16	Pass
40.00	0.14	-0.70	0.70	0.16	Pass
41.00	0.13	-0.70	0.70	0.16	Pass
42.00	0.09	-0.70	0.70	0.16	Pass
43.00	0.09	-0.70	0.70	0.17	Pass
44.00	0.03	-0.70	0.70	0.17	Pass
45.00	0.04	-0.70	0.70	0.16	Pass
46.00	0.04	-0.70	0.70	0.16	Pass
47.00	0.02	-0.70	0.70	0.16	Pass
48.00	0.01	-0.70	0.70	0.16	Pass
49.00	0.00	-0.70	0.70	0.16	Pass
54.00	-0.03	-0.70	0.70	0.16	Pass
59.00	-0.04	-0.70	0.70	0.16	Pass
64.00	-0.03	-0.70	0.70	0.16	Pass
69.00	-0.04	-0.70	0.70	0.16	Pass
74.00	-0.05	-0.70	0.70	0.16	Pass
79.00	-0.05	-0.70	0.70	0.16	Pass
84.00	-0.04	-0.70	0.70	0.16	Pass
89.00	-0.04	-0.70	0.70	0.16	Pass
94.00	-0.04	-0.70	0.70	0.16	Pass
99.00	0.01	-0.70	0.70	0.15	Pass
104.00	0.02	-0.70	0.70	0.15	Pass
109.00	0.01	-0.70	0.70	0.15	Pass
114.00	0.00	-0.70	0.70	0.15	Pass
119.00	0.00	-0.70	0.70	0.15	Pass
124.00	0.01	-0.70	0.70	0.15	Pass
129.00	0.01	-0.70	0.70	0.15	Pass
134.00	0.01	-0.70	0.70	0.15	Pass
136.00	0.01	-0.70	0.70	0.15	Pass
137.00	0.01	-0.70	0.70	0.15	Pass
138.00	0.00	-0.70	0.70	0.15	Pass



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## Peak Rise Time

Peak rise time performed according to IEC 60651:2001 9.4.4 and ANSI S1.4:1983 (R2006) 8.4.4

Amplitude [dB]		Duration [µs]	Test Result [dB]	Lower limit [dB]	Upper limit [dB]	Expanded Uncertainty [dB]	Result
136.95	40	Negative Pulse	135.14	133.65	135.65	0.15	Pass
		Positive Pulse	135.12	133.64	135.64	0.15	Pass
	30	Negative Pulse	134.20	133.65	135.65	0.15	Pass
		Positive Pulse	134.20	133.64	135.64	0.15	Pass
		-- End of measurement results--					

## Positive Pulse Crest Factor

## 200 μs pulse tests at 2.0, 12.0, 22.0, 32.0 dB below Overload Limit

Crest Factor measured according to IEC 60651:2001 9.4.2 and ANSI S1.4:1983 (R2006) 8.4.2

Amplitude [dB]	Crest Factor	Test Result [dB]	Limits [dB]	Expanded Uncertainty [dB]	Result
135.95	3	OVLD	± 1.00	0.15 ±	Pass
	5	OVLD	± 1.00	0.15 ±	Pass
125.95	3	-0.14	± 1.00	0.15 ±	Pass
	5	-0.15	± 1.00	0.16 ±	Pass
115.95	3	-0.14	± 1.00	0.15 ±	Pass
	5	-0.14	± 1.00	0.15 ±	Pass
105.95	3	-0.15	± 1.00	0.15 ±	Pass
	5	-0.13	± 1.00	0.15 ±	Pass
-- End of measurement results--					

## Negative Pulse Crest Factor

## 200 μs pulse tests at 2.0, 12.0, 22.0, 32.0 dB below Overload Limit

Crest Factor measured according to IEC 60651:2001 9.4.2 and ANSI S1.4:1983 (R2006) 8.4.2

Amplitude [dB]	Crest Factor	Test Result [dB]	Limits [dB]	Expanded Uncertainty [dB]	Result
135.95	3	OVLD	± 1.00	0.15 ±	Pass
	5	OVLD	± 1.00	0.15 ±	Pass
125.95	3	-0.12	± 1.00	0.15 ±	Pass
	5	-0.13	± 1.00	0.15 ±	Pass
115.95	3	-0.13	± 1.00	0.15 ±	Pass
	5	-0.13	± 1.00	0.15 ±	Pass
105.95	3	-0.14	± 1.00	0.15 ±	Pass
	5	-0.12	± 1.00	0.15 ±	Pass
-- End of measurement results--					

## Gain

Gain measured according to IEC 61672-3:2013 17.3 and 17.4 and ANSI S1.4-2014 Part 3: 17.3 and 17.4

Measurement	Test Result [dB]	Lower limit [dB]	Upper limit [dB]	Expanded Uncertainty [dB]	Result
0 dB Gain	93.96	93.91	94.11	0.15	Pass
0 dB Gain, Linearity	40.26	39.41	40.81	0.16	Pass
OBA Low Range	94.02	93.91	94.11	0.15	Pass
OBA Normal Range	94.01	93.20	94.80	0.15	Pass
-- End of measurement results--					



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## Broadband Noise Floor

Self-generated noise measured according to IEC 61672-3:2013 11.2 and ANSI S1.4-2014 Part 3: 11.2

Measurement	Test Result [dB]	Upper limit [dB]	Result
A-weight Noise Floor	26.93	36.00	Pass
C-weight Noise Floor	26.82	35.00	Pass
Z-weight Noise Floor	32.70	39.00	Pass

-- End of measurement results--

## Total Harmonic Distortion

Measured using 1/3-Octave filters

Measurement	Test Result [dB]	Lower Limit [dB]	Upper Limit [dB]	Expanded Uncertainty [dB]	Result
10 Hz Signal	135.67	134.15	135.75	0.15	Pass
THD	-85.74	-58.00	-58.00	0.01 ±	Pass
THD+N	-82.05	-58.00	-58.00	0.01 ±	Pass

-- End of measurement results--

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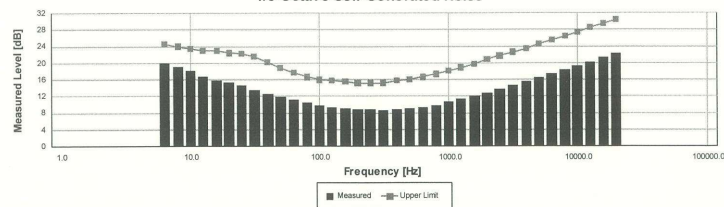
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## 1/3-Octave Self-Generated Noise



The SLM is set to low range.

Frequency [Hz]	Test Result [dB]	Upper limit [dB]	Result
6.30	19.93	24.60	Pass
8.00	19.05	24.00	Pass
10.00	18.09	23.50	Pass
12.50	16.82	23.00	Pass
16.00	15.82	22.90	Pass
20.00	15.31	22.40	Pass
25.00	14.66	22.30	Pass
31.50	13.58	21.50	Pass
40.00	12.50	20.20	Pass
50.00	11.82	18.80	Pass
63.00	11.10	17.60	Pass
80.00	10.41	16.60	Pass
100.00	9.77	15.90	Pass
125.00	9.30	15.70	Pass
160.00	9.00	15.50	Pass
200.00	8.78	15.20	Pass
250.00	8.72	15.20	Pass
315.00	8.68	15.20	Pass
400.00	8.73	15.70	Pass
500.00	8.96	16.00	Pass
630.00	9.37	16.60	Pass
800.00	9.86	17.30	Pass
1,000.00	10.60	18.10	Pass
1,250.00	11.29	18.90	Pass
1,600.00	12.01	19.80	Pass
2,000.00	12.77	20.80	Pass
2,500.00	13.64	21.70	Pass
3,150.00	14.52	22.60	Pass
4,000.00	15.43	23.50	Pass
5,000.00	16.38	24.50	Pass
6,300.00	17.34	25.50	Pass
8,000.00	18.30	26.50	Pass
10,000.00	19.27	27.40	Pass
12,500.00	20.25	28.50	Pass
16,000.00	21.24	29.50	Pass
20,000.00	22.23	30.40	Pass

-- End of measurement results--



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## Calibration Certificate

Certificate Number 2022003094

## Customer:

United Analyst and Engineering Consultant Co Ltd  
No. 81 Soi Udonsuk 41, Sukhumvit Road,  
Bangchak, Phra Khanong,  
Bangkok, 10260, Thailand

**Model Number** LxT2  
**Serial Number** 0006692  
**Test Results** Pass  
**Initial Condition** As Manufactured  
**Description** SoundTrack LxT Class 2  
Class 2 Sound Level Meter  
Firmware Revision: 2.404

**Procedure Number** D0001.8384  
**Technician** Jacob Cannon  
**Calibration Date** 11 Mar 2022  
**Calibration Due**  
**Temperature** 23.48 °C ± 0.25 °C  
**Humidity** 51.5 %RH ± 2.0 %RH  
**Static Pressure** 87.17 kPa ± 0.13 kPa

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

Larson Davis CAL200, S/N 9079  
Larson Davis PRMLxT2C, S/N 071561  
PCB 375A04, S/N 335076  
Larson Davis CAL291, S/N 0108

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

IEC 60651:2001 Type 2	ANSI S1.4-2014 Class 2
IEC 60804:2000 Type 2	ANSI S1.4 (R2006) Type 2
IEC 61252:2002	ANSI S1.11 (R2009) Class 2
IEC 61260:2001 Class 2	ANSI S1.25 (R2007)
IEC 61672:2013 Class 2	ANSI S1.43 (R2007) Type 2

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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-- End of Report--

Signatory:



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For 1/4" microphones, the Larson Davis ADP024 1/4" to 1/2" adaptor is used with the calibrators and the Larson Davis ADP043 1/4" to 1/2" adaptor is used with the preamplifier.

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

Periodic tests were performed in accordance with procedures from IEC 61672-3:2013 / ANSI/ASA S1.4-2014/Part 3.

No Pattern approval for IEC 61672-1:2013 / ANSI/ASA S1.4-2014/Part 1 available.

The sound level meter submitted for testing successfully completed the periodic tests of IEC 61672-3:2013 / ANSI/ASA S1.4-2014/Part 3, for the environmental conditions under which the tests were performed. However, no general statement or conclusion can be made about conformance of the sound level meter to the full specifications of IEC 61672-1:2013 / ANSI/ASA S1.4-2014/Part 1 because (a) evidence was not publicly available, from an independent testing organization responsible for pattern approvals, to demonstrate that the model of sound level meter fully conformed to the class 2 specifications in IEC 61672-1:2013 / ANSI/ASA S1.4-2014/Part 1 or correction data for acoustical test of frequency weighting were not provided in the Instruction Manual and (b) because the periodic tests of IEC 61672-3:2013 / ANSI/ASA S1.4-2014/Part 3 cover only a limited subset of the specifications in IEC 61672-1:2013 / ANSI/ASA S1.4-2014/Part 1.

## Standards Used

Description	Cal Date	Cal Due	Cal Standard
Larson Davis CAL291 Residual Intensity Calibrator	2021-09-10	2022-09-10	001250
Hart Scientific 2626-H Temperature Probe	2021-02-04	2022-08-04	006767
Larson Davis CAL200 Acoustic Calibrator	2021-07-21	2022-07-21	007027
Larson Davis Model 831	2022-02-21	2023-02-21	007182
PCB 377A13 1/2 inch Prepolarized Pressure Microphone	2022-03-02	2023-03-02	007185
SRS DS360 Ultra Low Distortion Generator	2021-04-13	2022-04-13	007635
Larson Davis 1/2" Preamplifier for Model 831 Type I	2021-09-28	2022-09-28	PCB0004783

## Acoustic Calibration

Measured according to IEC 61672-3:2013 10 and ANSI S1.4-2014 Part 3: 10

Measurement	Test Result [dB]	Lower Limit [dB]	Upper Limit [dB]	Expanded Uncertainty [dB]	Result
1000 Hz	114.01	113.80	114.20	0.14	Pass

## Loaded Circuit Sensitivity

Measurement	Test Result [dB re 1 V / Pa]	Lower Limit [dB re 1 V / Pa]	Upper Limit [dB re 1 V / Pa]	Expanded Uncertainty [dB]	Result
1000 Hz	-49.51	-52.44	-48.33	0.14	Pass

-- End of measurement results--

Certificate Number 2022003094

## Acoustic Signal Tests, C-weighting

Measured according to IEC 61672-3:2013 12 and ANSI S1.4-2014 Part 3: 12 using a comparison coupler with Unit Under Test (UUT) and reference SLM using slow time-weighted sound level for compliance to IEC 61672-1:2013 5.5; ANSI S1.4-2014 Part 1: 5.5

Frequency [Hz]	Test Result [dB]	Expected [dB]	Lower Limit [dB]	Upper Limit [dB]	Expanded Uncertainty [dB]	Result
125	-0.22	-0.20	-1.70	1.30	0.23	Pass
1000	0.12	0.00	-1.00	1.00	0.23	Pass
8000	-3.06	-3.00	-8.00	2.00	0.32	Pass

-- End of measurement results--

## Self-generated Noise

Measured according to IEC 61672-3:2013 11.1 and ANSI S1.4-2014 Part 3: 11.1

Measurement	Test Result [dB]
A-weighted	40.69

-- End of measurement results--

-- End of Report--

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# Calibration Certificate

Certificate Number 2022002971

**Customer:**

United Analyst and Engineering Consultant Co Ltd  
No. 81 Soi Udonsuk 41, Sukhumvit Road,  
Bangchak, Phra Khanong,  
Bangkok, 10260, Thailand

**Model Number** LxT2**Serial Number** 0006692**Test Results** Pass**Initial Condition** As Manufactured**Description** SoundTrack LxT Class 2  
Class 2 Sound Level Meter  
Firmware Revision: 2.404**Procedure Number** D0001.8378**Technician** Jacob Cannon**Calibration Date** 9 Mar 2022**Calibration Due****Temperature** 23.91 °C ± 0.25 °C**Humidity** 50.6 %RH ± 2.0 %RH**Static Pressure** 85.35 kPa ± 0.13 kPa**Evaluation Method**

Tested electrically using Larson Davis PRMLxT2C S/N 071561 and a 12.0 pF capacitor to simulate microphone capacitance. Data reported in dB re 20 µPa assuming a microphone sensitivity of 50.0 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 2

IEC 60804:2000 Type 2

IEC 61252:2002

IEC 61672:2013 Class 2

IEC 61260:2001 Class 2

ANSI S1.4-2014 Class 2

ANSI S1.4 (R2006) Type 2

ANSI S1.25 (R2007)

ANSI S1.43 (R2007) Type 2

ANSI S1.11 (R2009) Class 2

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 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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Description	Standards Used		
	Cal Date	Cal Due	Cal Standard
Hart Scientific 2626-H Temperature Probe	2021-02-04	2022-08-04	086767
SRS DS360 Ultra Low Distortion Generator	2021-07-22	2022-07-22	007174

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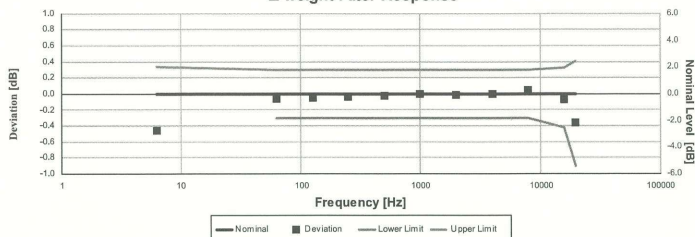
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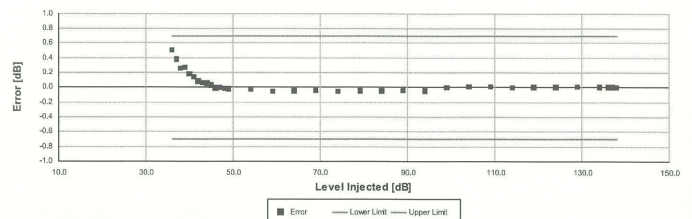
**Z-weight Filter Response**

Electrical signal test of frequency weighting performed according to IEC 61672-3:2013 13 and ANSI S1.4-2014 Part 3: 13 for compliance to IEC 61672-1:2013 5.5, IEC 60651:2001 6.1 and 9.2.2, IEC 60804:2000 5.5, ANSI S1.4:1983 (R2006) 5.1 and 8.2.1, ANSI S1.4-2014 Part 1: 5.5

Frequency [Hz]	Test Result [dB]	Deviation [dB]	Lower limit [dB]	Upper limit [dB]	Expanded Uncertainty [dB]	Result
6.31	-0.45	-0.45	-1.11	0.33	0.15	Pass
63.10	-0.06	-0.06	-0.30	0.30	0.15	Pass
125.89	-0.05	-0.05	-0.30	0.30	0.15	Pass
251.19	-0.04	-0.04	-0.30	0.30	0.15	Pass
501.19	-0.03	-0.03	-0.30	0.30	0.15	Pass
1,000.00	0.00	0.00	-0.30	0.30	0.15	Pass
1,995.26	-0.01	-0.01	-0.30	0.30	0.15	Pass
3,981.07	0.00	0.00	-0.30	0.30	0.15	Pass
7,943.28	0.05	0.05	-0.30	0.30	0.15	Pass
15,848.93	-0.08	-0.08	-0.42	0.32	0.15	Pass
19,952.62	-0.36	-0.36	-0.91	0.41	0.15	Pass

-- End of measurement results--

Certificate Number 2022002971

**A-weighted Broadband Log Linearity: 8,000.00 Hz**

Broadband level linearity performed according to IEC 61672-3:2013 16 and ANSI S1.4-2014 Part 3: 16 for compliance to IEC 61672-1:2013 5.6, IEC 60804:2000 6.2, IEC 61252:2002 8, ANSI S1.4 (R2006) 6.9, ANSI S1.4-2014 Part 1: 5.6, ANSI S1.43 (R2007) 6.2

Level [dB]	Error [dB]	Lower limit [dB]	Upper limit [dB]	Expanded Uncertainty [dB]	Result
36.00	0.50	-0.70	0.70	0.16	Pass
37.00	0.38	-0.70	0.70	0.16	Pass
38.00	0.26	-0.70	0.70	0.16	Pass
39.00	0.27	-0.70	0.70	0.16	Pass
40.00	0.18	-0.70	0.70	0.16	Pass
41.00	0.15	-0.70	0.70	0.16	Pass
42.00	0.08	-0.70	0.70	0.16	Pass
43.00	0.06	-0.70	0.70	0.17	Pass
44.00	0.05	-0.70	0.70	0.17	Pass
45.00	0.03	-0.70	0.70	0.16	Pass
46.00	0.00	-0.70	0.70	0.16	Pass
47.00	0.00	-0.70	0.70	0.16	Pass
48.00	-0.01	-0.70	0.70	0.16	Pass
49.00	-0.02	-0.70	0.70	0.16	Pass
50.00	-0.03	-0.70	0.70	0.16	Pass
51.00	-0.05	-0.70	0.70	0.16	Pass
52.00	-0.05	-0.70	0.70	0.16	Pass
53.00	-0.04	-0.70	0.70	0.16	Pass
54.00	-0.05	-0.70	0.70	0.16	Pass
55.00	-0.05	-0.70	0.70	0.16	Pass
56.00	-0.05	-0.70	0.70	0.16	Pass
57.00	-0.05	-0.70	0.70	0.16	Pass
58.00	-0.05	-0.70	0.70	0.16	Pass
59.00	-0.05	-0.70	0.70	0.16	Pass
60.00	-0.05	-0.70	0.70	0.16	Pass
61.00	-0.05	-0.70	0.70	0.16	Pass
62.00	-0.05	-0.70	0.70	0.16	Pass
63.00	-0.05	-0.70	0.70	0.16	Pass
64.00	-0.05	-0.70	0.70	0.16	Pass
65.00	-0.05	-0.70	0.70	0.16	Pass
66.00	-0.05	-0.70	0.70	0.16	Pass
67.00	-0.05	-0.70	0.70	0.16	Pass
68.00	-0.05	-0.70	0.70	0.16	Pass
69.00	-0.05	-0.70	0.70	0.16	Pass
70.00	-0.05	-0.70	0.70	0.16	Pass
71.00	-0.05	-0.70	0.70	0.16	Pass
72.00	-0.05	-0.70	0.70	0.16	Pass
73.00	-0.05	-0.70	0.70	0.16	Pass
74.00	-0.05	-0.70	0.70	0.16	Pass
75.00	-0.05	-0.70	0.70	0.16	Pass
76.00	-0.05	-0.70	0.70	0.16	Pass
77.00	-0.05	-0.70	0.70	0.16	Pass
78.00	-0.05	-0.70	0.70	0.16	Pass
79.00	-0.05	-0.70	0.70	0.16	Pass
80.00	-0.05	-0.70	0.70	0.16	Pass
81.00	-0.05	-0.70	0.70	0.16	Pass
82.00	-0.05	-0.70	0.70	0.16	Pass
83.00	-0.05	-0.70	0.70	0.16	Pass
84.00	-0.05	-0.70	0.70	0.16	Pass
85.00	-0.05	-0.70	0.70	0.16	Pass
86.00	-0.05	-0.70	0.70	0.16	Pass
87.00	-0.05	-0.70	0.70	0.16	Pass
88.00	-0.05	-0.70	0.70	0.16	Pass
89.00	-0.05	-0.70	0.70	0.16	Pass
90.00	-0.05	-0.70	0.70	0.16	Pass
91.00	-0.05	-0.70	0.70	0.16	Pass
92.00	-0.05	-0.70	0.70	0.16	Pass
93.00	-0.05	-0.70	0.70	0.16	Pass
94.00	-0.05	-0.70	0.70	0.16	Pass
95.00	-0.05	-0.70	0.70	0.16	Pass
96.00	-0.05	-0.70	0.70	0.16	Pass
97.00	-0.05	-0.70	0.70	0.16	Pass
98.00	-0.05	-0.70	0.70	0.16	Pass
99.00	-0.05	-0.70	0.70	0.16	Pass
100.00	-0.05	-0.70	0.70	0.16	Pass
101.00	-0.05	-0.70	0.70	0.16	Pass
102.00	-0.05	-0.70	0.70	0.16	Pass
103.00	-0.05	-0.70	0.70	0.16	Pass
104.00	-0.05	-0.70	0.70	0.16	Pass
105.00	-0.05	-0.70	0.70	0.16	Pass
106.00	-0.05	-0.70	0.70	0.16	Pass
107.00	-0.05	-0.70	0.70	0.16	Pass
108.00	-0.05	-0.70	0.70	0.16	Pass
109.00	-0.05	-0.70	0.70	0.16	Pass
110.00	-0.05	-0.70	0.70	0.16	Pass
111.00	-0.05	-0.70	0.70	0.16	Pass
112.00	-0.05	-0.70	0.70	0.16	Pass
113.00	-0.05	-0.70	0.70	0.16	Pass
114.00	-0.05	-0.70	0.70	0.16	Pass
115.00	-0.05	-0.70	0.70	0.16	Pass
116.00	-0.05	-0.70	0.70	0.16	Pass
117.00	-0.05	-0.70	0.70	0.16	Pass
118.00	-0.05	-0.70	0.70	0.16	Pass
119.00	-0.05	-0.70	0.70	0.16	Pass
120.00	-0.05	-0.70	0.70	0.16	Pass
121.00	-0.05	-0.70	0.70	0.16	Pass
122.00	-0.05	-0.70	0.70	0.16	Pass
123.00	-0.05	-0.70	0.70	0.16	Pass
124.00	-0.05	-0.70	0.70	0.16	Pass
125.00	-0.05	-0.70	0.70	0.16	Pass
126.00	-0.05	-0.70	0.70	0.16	Pass
127.00	-0.05	-0.70	0.70	0.16	Pass
128.00	-0.05	-0.70	0.70	0.16	Pass
129.00	-0.05	-0.70	0.70	0.16	Pass
130.00	-0.05	-0.70	0.70	0.16	Pass

-- End of measurement results--

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## Peak Rise Time

Peak rise time performed according to IEC 60651:2001 9.4.4 and ANSI S1.4:1983 (R2006) 8.4.4

Amplitude [dB]	Duration [μs]		Test Result [dB]	Lower limit [dB]	Upper limit [dB]	Expanded Uncertainty [dB]	Result
136.95	40	Negative Pulse	135.03	133.55	135.55	0.15	Pass
		Positive Pulse	135.12	133.64	135.64	0.15	Pass
	30	Negative Pulse	133.78	133.55	135.55	0.15	Pass
		Positive Pulse	133.90	133.64	135.64	0.15	Pass
-- End of measurement results--							

## Positive Pulse Crest Factor

## 200 μs pulse tests at 2.0, 12.0, 22.0, 32.0 dB below Overload Limit

Crest Factor measured according to IEC 60651:2001 9.4.2 and ANSI S1.4:1983 (R2006) 8.4.2

Amplitude [dB]	Crest Factor	Test Result [dB]	Limits [dB]	Expanded Uncertainty [dB]	Result
135.95	3	OVLD	± 1.00	0.15 ±	Pass
	5	OVLD	± 1.00	0.15 ±	Pass
125.95	3	-0.15	± 1.00	0.15 ±	Pass
	5	-0.14	± 1.00	0.16 ±	Pass
115.95	3	-0.15	± 1.00	0.15 ±	Pass
	5	-0.14	± 1.00	0.15 ±	Pass
105.95	3	-0.12	± 1.00	0.15 ±	Pass
	5	-0.13	± 1.00	0.15 ±	Pass
-- End of measurement results--					

## Negative Pulse Crest Factor

## 200 μs pulse tests at 2.0, 12.0, 22.0, 32.0 dB below Overload Limit

Crest Factor measured according to IEC 60651:2001 9.4.2 and ANSI S1.4:1983 (R2006) 8.4.2

Amplitude [dB]	Crest Factor	Test Result [dB]	Limits [dB]	Expanded Uncertainty [dB]	Result
135.95	3	OVLD	± 1.00	0.15 ±	Pass
	5	OVLD	± 1.00	0.15 ±	Pass
125.95	3	-0.20	± 1.00	0.15 ±	Pass
	5	-0.19	± 1.00	0.15 ±	Pass
115.95	3	-0.21	± 1.00	0.15 ±	Pass
	5	-0.18	± 1.00	0.15 ±	Pass
105.95	3	-0.15	± 1.00	0.15 ±	Pass
	5	-0.17	± 1.00	0.15 ±	Pass
-- End of measurement results--					

## Gain

Gain measured according to IEC 61672-3:2013 17.3 and 17.4 and ANSI S1.4-2014 Part 3: 17.3 and 17.4

Measurement	Test Result [dB]	Lower limit [dB]	Upper limit [dB]	Expanded Uncertainty [dB]	Result
0 dB Gain	93.94	93.89	94.09	0.15	Pass
0 dB Gain, Linearity	40.30	39.39	40.79	0.16	Pass
OBA Low Range	93.99	93.89	94.09	0.15	Pass
OBA Normal Range	93.99	93.20	94.80	0.15	Pass
-- End of measurement results--					

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## Broadband Noise Floor

Self-generated noise measured according to IEC 61672-3:2013 11.2 and ANSI S1.4-2014 Part 3: 11.2

Measurement	Test Result [dB]	Upper limit [dB]	Result
A-weight Noise Floor	26.87	36.00	Pass
C-weight Noise Floor	26.80	35.00	Pass
Z-weight Noise Floor	32.77	39.00	Pass

-- End of measurement results--

## Total Harmonic Distortion

Measured using 1/3-Octave filters

Measurement	Test Result [dB]	Lower Limit [dB]	Upper Limit [dB]	Expanded Uncertainty [dB]	Result
10 Hz Signal	135.67	134.15	135.75	0.15	Pass
THD	-67.46	-58.00	-58.00	0.01 ±	Pass
THD+N	-62.99	-58.00	-58.00	0.01 ±	Pass

-- End of measurement results--

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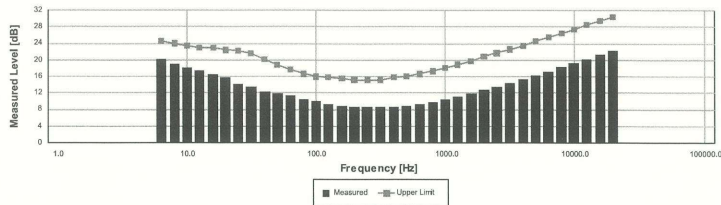
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## 1/3-Octave Self-Generated Noise



The SLM is set to low range.

Frequency [Hz]	Test Result [dB]	Upper limit [dB]	Result
6.30	20.21	24.60	Pass
8.00	19.11	24.00	Pass
10.00	18.05	23.50	Pass
12.50	17.39	23.00	Pass
16.00	16.36	22.90	Pass
20.00	15.76	22.40	Pass
25.00	14.17	22.30	Pass
31.50	13.44	21.50	Pass
40.00	12.40	20.20	Pass
50.00	11.80	18.80	Pass
63.00	11.26	17.60	Pass
80.00	10.46	16.60	Pass
100.00	10.00	15.90	Pass
125.00	9.22	15.70	Pass
160.00	8.88	15.50	Pass
200.00	8.61	15.20	Pass
250.00	8.49	15.20	Pass
315.00	8.48	15.20	Pass
400.00	8.54	15.70	Pass
500.00	8.83	16.00	Pass
630.00	9.25	16.60	Pass
800.00	9.78	17.30	Pass
1,000.00	10.35	18.10	Pass
1,250.00	11.10	18.90	Pass
1,600.00	11.86	19.80	Pass
2,000.00	12.67	20.80	Pass
2,500.00	13.54	21.70	Pass
3,150.00	14.41	22.60	Pass
4,000.00	15.39	23.50	Pass
5,000.00	16.36	24.50	Pass
6,300.00	17.29	25.50	Pass
8,000.00	18.25	26.50	Pass
10,000.00	19.28	27.40	Pass
12,500.00	20.24	28.50	Pass
16,000.00	21.24	29.50	Pass
20,000.00	22.22	30.40	Pass
-- End of measurement results--			

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-- End of Report--

Signatory:

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Calibration Certificate

Certificate Number 2022002973

Customer:  
United Analyst and Engineering Consultant Co Ltd  
No. 81 Soi Udonsuk 41, Sukhumvit Road,  
Bangchak, Phra Khanong,  
Bangkok, 10260, Thailand

Model Number LxT2

Serial Number 0006693

Test Results Pass

Initial Condition As Manufactured

Description SoundTrack LxT Class 2  
Class 2 Sound Level Meter  
Firmware Revision: 2.404

Procedure Number D0001.8378

Technician Jacob Cannon

Calibration Date 9 Mar 2022

Calibration Due

Temperature 23.73 °C ± 0.25 °C

Humidity 49.5 %RH ± 2.0 %RH

Static Pressure 85.37 kPa ± 0.13 kPa

Evaluation Method Tested electrically using Larson Davis PRMLxT2C S/N 071562 and a 12.0 pF capacitor to simulate microphone capacitance. Data reported in dB re 20 µPa assuming a microphone sensitivity of 50.0 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 2	ANSI S1.4-2014 Class 2
IEC 60804:2000 Type 2	ANSI S1.4 (R2006) Type 2
IEC 61252:2002	ANSI S1.25 (R2007)
IEC 61672:2013 Class 2	ANSI S1.43 (R2007) Type 2
IEC 61260:2001 Class 2	ANSI S1.11 (R2009) Class 2

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.

This report may not be reproduced, except in full, unless permission for the publication of an approved abstract is obtained in writing from the organization issuing this report.

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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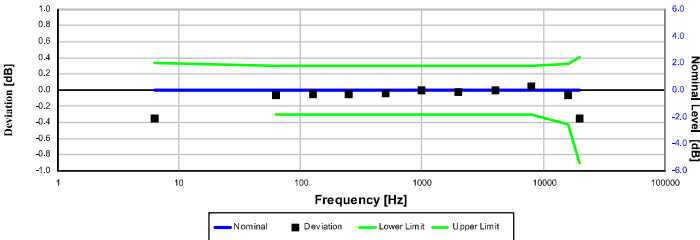
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Certificate Number 2022002973

Z-weight Filter Response



Electrical signal test of frequency weighting performed according to IEC 61672-3:2013 13 and ANSI S1.4-2014 Part 3: 13 for compliance to IEC 61672-1:2013 5.5; IEC 60651:2001 6.1 and 9.2.2; IEC 60804:2000 5; ANSI S1.4:1983 (R2006) 5.1 and 8.2.1; ANSI S1.4-2014 Part 1: 5.5

Frequency [Hz]	Test Result [dB]	Deviation [dB]	Lower limit [dB]	Upper limit [dB]	Expanded Uncertainty [dB]	Result
6.31	-0.35	-0.35	-1.11	0.33	0.15	Pass
63.10	-0.06	-0.06	-0.30	0.30	0.15	Pass
125.89	-0.05	-0.05	-0.30	0.30	0.15	Pass
251.19	-0.05	-0.05	-0.30	0.30	0.15	Pass
501.19	-0.03	-0.03	-0.30	0.30	0.15	Pass
1,000.00	0.00	0.00	-0.30	0.30	0.15	Pass
1,995.26	-0.02	-0.02	-0.30	0.30	0.15	Pass
3,981.07	-0.01	-0.01	-0.30	0.30	0.15	Pass
7,963.28	0.04	0.04	-0.30	0.30	0.15	Pass
15,848.93	-0.07	-0.07	-0.42	0.32	0.15	Pass
19,952.62	-0.35	-0.35	-0.91	0.41	0.15	Pass

– End of measurement results–

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Description	Standards Used		
Hart Scientific 2626-H Temperature Probe	Cal Date 2021-02-04	Cal Due 2022-08-04	Cal Standard 006767
SRS DS360 Ultra Low Distortion Generator	2022-01-03	2023-01-03	007118

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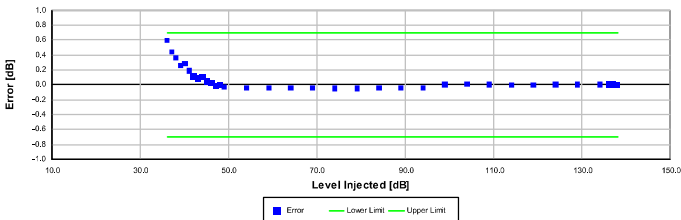
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Certificate Number 2022002973

A-weighted Broadband Log Linearity: 8,000.00 Hz



Broadband level linearity performed according to IEC 61672-3:2013 16 and ANSI S1.4-2014 Part 3: 16 for compliance to IEC 61672-1:2013 5.6; IEC 60804:2000 6.2; IEC 61252:2002 8; ANSI S1.4 (R2006) 6.9; ANSI S1.4-2014 Part 1: 5.6; ANSI S1.43 (R2007) 6.2

Level [dB]	Error [dB]	Lower limit [dB]	Upper limit [dB]	Expanded Uncertainty [dB]	Result
36.00	0.60	-0.70	0.70	0.16	Pass
37.00	0.44	-0.70	0.70	0.16	Pass
38.00	0.37	-0.70	0.70	0.16	Pass
39.00	0.26	-0.70	0.70	0.16	Pass
40.00	0.28	-0.70	0.70	0.16	Pass
41.00	0.19	-0.70	0.70	0.16	Pass
42.00	0.11	-0.70	0.70	0.16	Pass
43.00	0.08	-0.70	0.70	0.17	Pass
44.00	0.10	-0.70	0.70	0.17	Pass
45.00	0.05	-0.70	0.70	0.16	Pass
46.00	0.02	-0.70	0.70	0.16	Pass
47.00	-0.01	-0.70	0.70	0.16	Pass
48.00	0.00	-0.70	0.70	0.16	Pass
49.00	-0.03	-0.70	0.70	0.16	Pass
50.00	-0.04	-0.70	0.70	0.16	Pass
51.00	-0.04	-0.70	0.70	0.16	Pass
52.00	-0.04	-0.70	0.70	0.16	Pass
53.00	-0.04	-0.70	0.70	0.16	Pass
54.00	-0.05	-0.70	0.70	0.16	Pass
55.00	-0.05	-0.70	0.70	0.16	Pass
56.00	-0.05	-0.70	0.70	0.16	Pass
57.00	-0.04	-0.70	0.70	0.16	Pass
58.00	-0.04	-0.70	0.70	0.16	Pass
59.00	-0.04	-0.70	0.70	0.16	Pass
60.00	-0.04	-0.70	0.70	0.16	Pass
61.00	-0.04	-0.70	0.70	0.16	Pass
62.00	-0.05	-0.70	0.70	0.16	Pass
63.00	-0.05	-0.70	0.70	0.16	Pass
64.00	-0.05	-0.70	0.70	0.16	Pass
65.00	-0.05	-0.70	0.70	0.16	Pass
66.00	-0.05	-0.70	0.70	0.16	Pass
67.00	-0.05	-0.70	0.70	0.16	Pass
68.00	-0.05	-0.70	0.70	0.16	Pass
69.00	-0.05	-0.70	0.70	0.16	Pass
70.00	-0.05	-0.70	0.70	0.16	Pass
71.00	-0.05	-0.70	0.70	0.16	Pass
72.00	-0.05	-0.70	0.70	0.16	Pass
73.00	-0.05	-0.70	0.70	0.16	Pass
74.00	-0.05	-0.70	0.70	0.16	Pass
75.00	-0.05	-0.70	0.70	0.16	Pass
76.00	-0.05	-0.70	0.70	0.16	Pass
77.00	-0.05	-0.70	0.70	0.16	Pass
78.00	-0.05	-0.70	0.70	0.16	Pass
79.00	-0.05	-0.70	0.70	0.16	Pass
80.00	-0.05	-0.70	0.70	0.16	Pass
81.00	-0.05	-0.70	0.70	0.16	Pass
82.00	-0.05	-0.70	0.70	0.16	Pass
83.00	-0.05	-0.70	0.70	0.16	Pass
84.00	-0.05	-0.70	0.70	0.16	Pass
85.00	-0.05	-0.70	0.70	0.16	Pass
86.00	-0.05	-0.70	0.70	0.16	Pass
87.00	-0.05	-0.70	0.70	0.16	Pass
88.00	-0.05	-0.70	0.70	0.16	Pass
89.00	-0.05	-0.70	0.70	0.16	Pass
90.00	-0.05	-0.70	0.70	0.16	Pass
91.00	-0.05	-0.70	0.70	0.16	Pass
92.00	-0.05	-0.70	0.70	0.16	Pass
93.00	-0.05	-0.70	0.70	0.16	Pass
94.00	-0.05	-0.70	0.70	0.16	Pass
95.00	-0.05	-0.70	0.70	0.16	Pass
96.00	-0.05	-0.70	0.70	0.16	Pass
97.00	-0.05	-0.70	0.70	0.16	Pass
98.00	-0.05	-0.70	0.70	0.16	Pass
99.00	-0.05	-0.70	0.70	0.16	Pass
100.00	-0.05	-0.70	0.70	0.16	Pass
101.00	-0.05	-0.70	0.70	0.16	Pass
102.00	-0.05	-0.70	0.70	0.16	Pass
103.00	-0.05	-0.70	0.70	0.16	Pass
104.00	-0.05	-0.70	0.70	0.16	Pass
105.00	-0.05	-0.70	0.70	0.16	Pass
106.00	-0.05	-0.70	0.70	0.16	Pass
107.00	-0.05	-0.70	0.70	0.16	Pass
108.00	-0.05	-0.70	0.70	0.16	Pass
109.00	-0.05	-0.70	0.70	0.16	Pass
110.00	-0.05	-0.70	0.70	0.16	Pass
111.00	-0.05	-0.70	0.70	0.16	Pass
112.00	-0.05	-0.70	0.70	0.16	Pass
113.00	-0.05	-0.70	0.70	0.16	Pass
114.00	-0.05	-0.70	0.70	0.16	Pass
115.00	-0.05	-0.70	0.70	0.16	Pass
116.00	-0.05	-0.70	0.70	0.16	Pass
117.00	-0.05	-0.70	0.70	0.16	Pass
118.00	-0.05	-0.70	0.70	0.16	Pass
119.00	-0.05	-0.70	0.70	0.16	Pass
120.00	-0.05	-0.70	0.70	0.16	Pass
121.00	-0.05	-0.70	0.70	0.16	Pass
122.00	-0.05	-0.70	0.70	0.16	Pass
123.00	-0.05	-0.70	0.70	0.16	Pass
124.00	-0.05	-0.70	0.70	0.16	Pass
125.00	-0.05	-0.70	0.70	0.16	Pass
126.00	-0.05	-0.70	0.70	0.16	Pass
127.00	-0.05	-0.70	0.70	0.16	Pass
128.00	-0.05	-0.70	0.70	0.16	Pass
129.00	-0.05	-0.70	0.70	0.16	Pass
130.00	-0.05	-0.70	0.70	0.16	Pass
131.00	-0.05	-0.70	0.70	0.16	Pass
132.00	-0.05	-0.70	0.70	0.16	Pass
133.00	-0.05	-0.70	0.70	0.16	Pass
134.00	-0.05	-0.70	0.70	0.16	Pass
135.00	-0.05	-0.70	0.70	0.16	Pass
136.00	-0.05	-0.70	0.70	0.16	Pass
137.00	-0.05	-0.70	0.70	0.16	Pass
138.00	-0.05	-0.70	0.70	0.16	Pass

– End of measurement results–

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### Peak Rise Time

Peak rise time performed according to IEC 60651:2001 9.4.4 and ANSI S1.4:1983 (R2006) 8.4.4

Amplitude [dB]	Duration [µs]		Test Result [dB]	Lower limit [dB]	Upper limit [dB]	Expanded Uncertainty [dB]	Result
136,95	40	Negative Pulse	135,01	133,52	135,52	0,15	Pass
		Positive Pulse	134,99	133,51	135,51	0,15	Pass
	30	Negative Pulse	134,07	133,52	135,52	0,15	Pass
		Positive Pulse	134,07	133,51	135,51	0,15	Pass
		– End of measurement results–					

### Positive Pulse Crest Factor

#### 200 µs pulse tests at 2.0, 12.0, 22.0, 32.0 dB below Overload Limit

Crest Factor measured according to IEC 60651:2001 9.4.2 and ANSI S1.4:1983 (R2006) 8.4.2

Amplitude [dB]	Crest Factor		Test Result [dB]	Limits [dB]	Expanded Uncertainty [dB]	Result
135.95	3	OVLD	± 1.00	± 1.00	0.15 ±	Pass
	5	OVLD	± 1.00	± 1.00	0.15 ±	Pass
125.95	3	-0.13	± 1.00	± 1.00	0.15 ±	Pass
	5	-0.15	± 1.00	± 1.00	0.16 ±	Pass
115.95	3	-0.14	± 1.00	± 1.00	0.15 ±	Pass
	5	-0.14	± 1.00	± 1.00	0.15 ±	Pass
105.95	3	-0.15	± 1.00	± 1.00	0.15 ±	Pass
	5	-0.14	± 1.00	± 1.00	0.15 ±	Pass
-- End of measurement results--						

### Negative Pulse Crest Factor

#### 200 µs pulse tests at 2.0, 12.0, 22.0, 32.0 dB below Overload Limit

Crest Factor measured according to IEC 60651:2001 9.4.2 and ANSI S1.4:1983 (R2006) 8.4.2

Amplitude [dB]	Crest Factor		Test Result [dB]	Limits [dB]	Expanded Uncertainty [dB]	Result
135.95	3	OVLD	± 1.00	± 1.00	0.15 ±	Pass
	5	OVLD	± 1.00	± 1.00	0.15 ±	Pass
125.95	3	-0.13	± 1.00	± 1.00	0.15 ±	Pass
	5	-0.11	± 1.00	± 1.00	0.15 ±	Pass
115.95	3	-0.13	± 1.00	± 1.00	0.15 ±	Pass
	5	-0.13	± 1.00	± 1.00	0.15 ±	Pass
105.95	3	-0.14	± 1.00	± 1.00	0.15 ±	Pass
	5	-0.13	± 1.00	± 1.00	0.15 ±	Pass
-- End of measurement results--						

### Gain

Gain measured according to IEC 61672-3:2013 17.3 and 17.4 and ANSI S1.4-2014 Part 3: 17.3 and 17.4

Measurement	Test Result [dB]	Lower limit [dB]	Upper limit [dB]	Expanded Uncertainty [dB]	Result
0 dB Gain	93.96	93.92	94.12	0.15	Pass
0 dB Gain, Linearity	40.29	39.42	40.82	0.16	Pass
OBA Low Range	94.02	93.92	94.12	0.15	Pass
OBA Normal Range	94.02	93.20	94.80	0.15	Pass
-- End of measurement results--					

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### Broadband Noise Floor

Self-generated noise measured according to IEC 61672-3:2013 11.2 and ANSI S1.4-2014 Part 3: 11.2

Measurement	Test Result [dB]	Upper limit [dB]	Result
A-weight Noise Floor	27.08	36.00	Pass
C-weight Noise Floor	26.90	35.00	Pass
Z-weight Noise Floor	32.76	39.00	Pass
-- End of measurement results--			

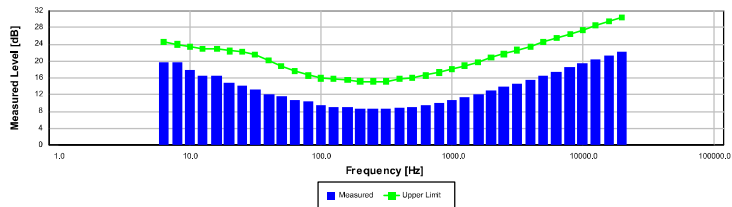
### Total Harmonic Distortion

Measured using 1/3-Octave filters

Measurement	Test Result [dB]	Lower Limit [dB]	Upper Limit [dB]	Expanded Uncertainty [dB]	Result
10 Hz Signal	135.53	134.15	135.75	0.15	Pass
THD	-67.24	-58.00	-58.00	0.01 ±	Pass
THD+N	-63.03	-58.00	-58.00	0.01 ±	Pass
-- End of measurement results--					

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### 1/3-Octave Self-Generated Noise



The SLM is set to low range.

Frequency [Hz]	Test Result [dB]	Upper limit [dB]	Result
6.30	19.82	24.60	Pass
8.00	19.80	24.00	Pass
10.00	17.93	23.50	Pass
12.50	16.57	23.00	Pass
16.00	16.43	22.90	Pass
20.00	14.79	22.40	Pass
25.00	14.06	22.30	Pass
31.50	13.20	21.50	Pass
40.00	12.12	20.20	Pass
50.00	11.65	18.80	Pass
63.00	10.68	17.60	Pass
80.00	10.37	16.60	Pass
100.00	9.56	15.90	Pass
125.00	9.15	15.70	Pass
160.00	8.94	15.50	Pass
200.00	8.64	15.20	Pass
250.00	8.63	15.20	Pass
315.00	8.57	15.20	Pass
400.00	8.85	15.70	Pass
500.00	9.05	16.00	Pass
630.00	9.46	16.60	Pass
800.00	10.00	17.30	Pass
1,000.00	10.69	18.10	Pass
1,250.00	11.33	18.90	Pass
1,600.00	12.15	19.80	Pass
2,000.00	12.96	20.80	Pass
2,500.00	13.82	21.70	Pass
3,150.00	14.67	22.60	Pass
4,000.00	15.61	23.50	Pass
5,000.00	16.52	24.50	Pass
6,300.00	17.49	25.50	Pass
8,000.00	18.47	26.50	Pass
10,000.00	19.40	27.40	Pass
12,500.00	20.42	28.50	Pass
16,000.00	21.33	29.50	Pass
20,000.00	22.34	30.40	Pass
-- End of measurement results--			

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