

ภาคผนวก ข

สำเนาใบรับรองการสอบเทียบเครื่องมือ

CERTIFICATE OF ANALYSIS
Grade of Product: EPA PROTOCOL STANDARD

Customer: BANGKOK INDUSTRIAL
Part Number: GAS CO LTD
Reference Number: 160-402557716-1
Cylinder Number: E04N199EBUACPC
Cylinder Volume: 83.0 CF
Laboratory: LL164665
124 - Plumsteadville - PA
Valve Outlet: 660
PGVP Number: A12022
Gas Code: CO, NO, NOX, SO2, BALN
Certification Date: Oct 21, 2022
Expiration Date: Oct 21, 2025

Certification performed in accordance with "U.S. Traceability Protocol for Assay and Certification of Gaseous Calibration Standards" (Rev. 2012) document EPA 8000-1-2521, 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 standard. All concentrations are on a multiple basis unless otherwise noted. The stated impurity level is based on the total gas volume of the cylinder and is not a percentage of the total gas. 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
NOX	45.00 PPM	45.01 PPM	G1	+/- 1.3% NIST Traceable
NITRIC OXIDE	45.00 PPM	45.01 PPM	G1	+/- 1.2% NIST Traceable
SULFUR DIOXIDE	45.00 PPM	45.11 PPM	G1	+/- 0.9% NIST Traceable
CARBON MONOXIDE	4500 PPM	4511 PPM	G1	+/- 0.8% NIST Traceable
NITROGEN	Balance			

CALIBRATION STANDARDS		
Type	Lot ID	Cylinder No
NT64	210637-21	C2710665
PRM	12595	D487860
QMS	12426689110	C5127674
NTRM	160102-32	KAL004062
NTRM	08012355	KAL004234
The SRM, PRM or QMS used above is only in reference to the QMS used in the assay and not part of the analysis.		

ANALYTICAL EQUIPMENT		
Instrument/Make/Model	Analytical Principle	Last Multipoint Calibration
SIEMENS ULTRAMAT 6 N100879	NDR	Sep 22, 2022
ROSCO FTR 100010345 NO2	FTR	Oct 20, 2022
ROSCO FTR 100010345 NO	FTR	Oct 06, 2022
ROSCO FTR 100010345 SO2	FTR	Sep 29, 2022

Test Data Available Upon Request

NOTES: PO# 5222004789

Gross Weight: 17.2 Kg

Net Weight: 2.7 Kg

Cylinder: 80A





บริษัท ไคเนติกส์ คอร์ปอเรชั่น จำกัด

KINETICS CORPORATION LTD.

รายงานผลการสอบเทียบเครื่องมือการตรวจวัดคุณภาพอากาศ

ลูกค้า / หน่วยงาน : SGS (Thailand) Co., Ltd

รายชื่ออุปกรณ์ / เครื่องมือ : NO_x Analyzer

ตรวจสอบ / เครื่องมือ : 1200

วันที่ : 24 กรกฎาคม 2566

บริษัทผู้ผลิต : Teledyne API

หมายเลขอุปกรณ์ / เครื่องมือ : 1652

ACQM (TON)

API MODEL: 1200		TEST VALUES	
		BEFORE	AFTER
1	RANGE	50 - 20,000 PPB	500.0
2	STABILITY	≤ 1 PPB	0.1
3	SAMPLE FLOW	550 ± 10% c/min	XXX
4	OZONE FLOW	80 ± 10% c/min	XXX
5	PMAT	mV	130.6
6	NORM PMAT	mV	31.0
7	A ZERO	20 To 150 mV	137.4
8	HPMS	480 - 500 V	749
9	RX CELL TEMP	50 ± 1 °C	50.0
10	BOX TEMP	AMBIENT ± 5 °C	28.3
11	PAT TEMP	7 ± 2 °C	6.8
12	IMULY TEMP	316 ± 5 °C	314.6
13	RX CELL PRESSURE	<10 in - Hg A	-3.0
14	SAMPLE PRESSURE	25 - 35 in - Hg A	29.0
15	NOX SLOPE	1.0 ± 0.3	1.150
16	NOX OFFSET	-50 To 150	3.0
17	NO SLOPE	1.0 ± 0.3	1.080
18	NO OFFSET	-50 To 150	1.8
19	NO SAMPLE READING	PPB	2.3
20	NO2 SAMPLE READING	PPB	57.7
21	NOX SAMPLE READING	PPB	60.0
22	OPTIC TEST	2000 ± 1000 mV	2219.0
23	ELECTRICAL TEST	2000 ± 1000 mV	2507.0
24	NO2 GAGE TEST	4.5 V - 12 V - 41.5 V - 15 V	5.26 / 12.33 / 15.02 / 15.21
25	ZERO GAS NONOX	0.000/0.00 PPB	-3.6 / -3.8
26	SPAN GAS NONOX	-400.00/400.00 PPB	0.50 / 0.90
			401.4 / 401.6

หมายเหตุ

- ทำการเทียบ Standard Film 3 ชิ้น, O-ring 3 ชิ้น, Spring 3 ชิ้น

- ตรวจสอบด้วย Multi Temp Warning, Refer Board Warning, Ozone Gen และ Sample Flow ไม่สามารถปรับค่า / เปลี่ยนได้เลย

- ทำการเทียบ Pressure Sensor U-15 PSN 3 ครั้ง 1 ชิ้น

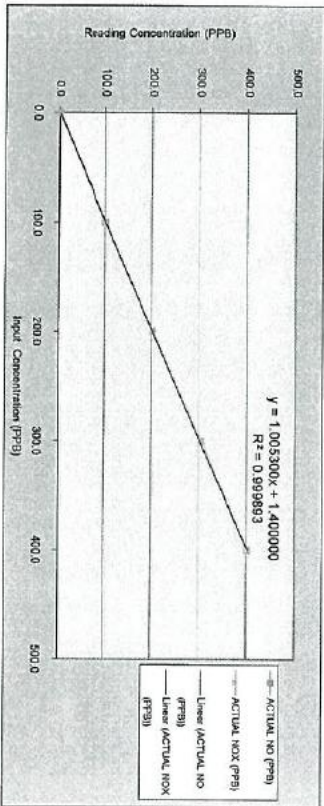
ต้องการข้อมูลเพิ่มเติมทางสำนักงานติดต่อ คุณวชิระสิทธิ์ โทร. 0-2515-8869 หรือ E-Mail : info@kinetics.co.th
เลขที่ 388 ถนนรัชดาภิเษก แขวงจตุจักร เขตจตุจักร กรุงเทพฯ 10900 โทรศัพท์ : 0-2515-8869 โทรสาร : 0-2515-8888 E-Mail : info@kinetics.co.th

MULTI POINT CALIBRATION REPORT

CUSTOMER NAME : SGS (Thailand) Co., Ltd		SERIAL NO : 1652	
EQUIPMENT NAME : NO _x Analyzer		CYLINDER NO : CCR45169	
MANUFACTURER : Teledyne API		CERTIFIED DATE : Mar 10, 2024	
STANDARD GAS CONCENTRATION (PPM) : 53.40		EXPIRED DATE : Mar 10, 2029	
CYLINDER PRESSURE (PSI) : 1420			
CERTIFIED BY : AIRGAS SPECIALTY GASES			

CALIBRATION RESULTS

POINT NO	CALIBRATION RESULTS			
	ERRA (PPM)	ACTUAL NO (PPM)	ERROR NO (PPM)	% ERROR NO, (PPM)
ZERO	0.0	0.5	0.5	0.0
1	10.0	101.0	1.0	1.7
2	200.0	202.2	2.2	1.1
3	300.0	305.4	5.4	1.8
4	400.0	401.4	1.4	0.4
AVERAGE (%)		1.0		1.3



CALIBRATED BY : คุณวชิระสิทธิ์ คุณวชิระสิทธิ์

ต้องการข้อมูลเพิ่มเติมทางสำนักงานติดต่อ : คุณวชิระสิทธิ์ โทรศัพท์ : 02-515-8869

เลขที่ 388 ถนนรัชดาภิเษก แขวงจตุจักร เขตจตุจักร กรุงเทพฯ 10900 โทรศัพท์ : 0-2515-8869 โทรสาร : 0-2515-8888 E-Mail : info@kinetics.co.th



Airgas Specialty Gases
Airgas USA, LLC
2441 Easton Road
Plymouth, PA 15949
Airgas.com

CERTIFICATE OF ANALYSIS

Grade of Product: EPA Protocol

Part Number: E04N989E15A0622
Reference Number: 160-402046891-1
Cylinder Volume: 144.4 CF
Laboratory: 124 - Plumsteadville - PA
Cylinder Pressure: 2015 PSIG
PGVP Number: A110201
Valve Outlet: 680
Gas Code: CO,NO,NOX,S02,BALN
Certification Date: Mar 10, 2021
Expiration Date: Mar 10, 2029

Certification performed in accordance with EPA Traceability Protocol for Assay and Certification of Gaseous Calibration Standards (May 2019) document EPA 820-R-12-051, using the assay procedures listed. Analytical methodology does not require correction for analytical interference. The cylinder has a total analytical uncertainty at 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 certified basis.

Do Not Use This Cylinder Before 160-402046891-1 Expiration Date

ANALYTICAL RESULTS				
Component	Requested Concentration	Actual Concentration	Protocol Method	Assay Dates
NOX	53.00 PPM	53.40 PPM	G1	03/03/2021, 03/10/2021
NITRIC OXIDE	53.00 PPM	53.40 PPM	G1	03/03/2021, 03/10/2021
SULFUR DIOXIDE	53.00 PPM	53.78 PPM	G1	03/03/2021, 03/10/2021
CARBON MONOXIDE	53.00 PPM	45.12 PPM	G1	03/03/2021, 03/10/2021
NITROGEN	Balance			03/04/2021

CALIBRATION STANDARDS			
Type	Lot ID	Cylinder No	Expiration Date
NTRM	0700227	1603 PPM NITRIC OXIDE/NITROGEN	Jul 23, 2023
PRM	12386	951 PPM AMMONIUM DIOXIDE	Feb 20, 2020
GMS	12400889	951 PPM NITROGEN DIOXIDE/NITROGEN	Aug 15, 2021
NTRM	1601003	951 PPM NITROGEN DIOXIDE/NITROGEN	Dec 23, 2021
NTRM	0801241	4357 PPM CARBON MONOXIDE/NITROGEN	Jun 07, 2024
The SRM, PRM or RGM noted above is only in reference to the GMS used by the facility and not part of the analysis.			

ANALYTICAL EQUIPMENT	
Instrument/Make/Model	Last Multipoint Calibration
SIEMENS ULTRAMAT 6 NIK570	Feb 26, 2021
Nicolet iS50 FTIR AUP2010245 NO	Feb 11, 2021
Nicolet iS50 FTIR AUP2010245 NO2	Feb 22, 2021
Nicolet iS50 FTIR AUP2010245 S02	Feb 15, 2021

Tras Data Available Upon Request

NOTES:
Gross Weight: 28.1 Kg
Net Weight: 4.6 Kg



160-402046891-1



ENVIR SERVICE CO. LTD.
42 Rongtong Road, 9th Floor, Rongtong, Bangkok 10200
Tel: 02-9438314-5 Fax: 02-9438301 www.envirservice.co.th

Analyzer Performance Test

Calibrated Date: 04 June 2024

Instruments Information

Analyzer Type: CO Analyzer
Model: 7000
Manufacturer: TEEDHNE
Serial Number: 1481

Calibrator Unit: Doab Model 5008
Dilutor Model: 705
Serial Number: 705
ZERO AIR Generator: API MODEL 701
Serial Number: 1924

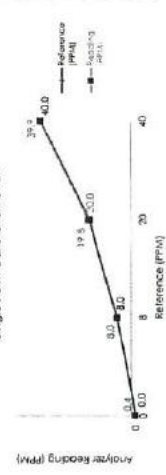
Standard Gas Concentration
Nitric Oxide (NO): 957.2 PPM
Sulfur Dioxide (SO2): 960.7 PPM
Carbon Monoxide (CO): 960.4 PPM
Cylinder number: E80123127
Expiry Date: 11 Oct 2027

Environment: Temperature: 25.5 °C Humidity: 51 %RH

Calibration Report

Calibration Results			
Point No.	Reference (PPM)	Reading (PPM)	Error
1	0.0	0.4	0.4
2	8.0	8.0	0.0
3	20.0	19.8	-0.2
4	40.0	39.9	-0.1

Single Point Calibration Chart





ENVIRA SERVICE
42 Raminthra 14 yeak 9, Tha Raeng, Bangkhon, Bangkok 10230
Tel : 02-9435814-5 Fax : 02-9438201 Tax id : 0105555170865

REPORT QA GAS-CALIBRATOR

CALIBRATE DATE: 25-May-24

GAS CALIBRATOR
MANUFACTURER : Dashi MODEL : 5008 S/N: 705
FLOW CALIBRATOR : DryCal® DC-Lite MODEL : DCL-H S/N: 107934
MODEL : DCLT 5K S/N : 2105
MANUFACTURER : Bios International Corporation

REPORT QA GAS-CALIBRATOR (BEFORE)

AIR FLOW (LPM)	SETTING	0.50	1.00	1.50	2.00	2.50	3.00	3.50	4.00	4.50	5.00	AVG
	REF	0.36	0.76	1.16	1.56	1.95	2.34	2.73	3.13	3.53	3.92	
	%ERROR	-28.60	-24.10	-22.87	-22.15	-22.08	-22.03	-22.03	-21.85	-21.67	-21.66	
	SETTING	5.50	6.00	6.50	7.00	7.50	8.00	8.50	9.00	9.50	10.00	-21.81
	REF	4.32	4.71	5.11	5.52	5.93	6.34	6.77	7.18	7.61	8.08	
	%ERROR	-21.51	-21.45	-21.16	-20.99	-20.78	-20.41	-20.24	-19.89	-19.23	-19.23	

Gas FLOW (CCM)	SETTING	5.00	10.00	15.00	20.00	25.00	30.00	35.00	40.00	45.00	50.00	AVG
	REF	1.53	7.29	12.90	18.38	23.84	29.35	34.72	39.98	45.23	50.38	
	%ERROR	-69.40	-27.06	-14.00	-8.10	-4.64	-2.17	-0.80	-0.05	0.51	0.76	
	SETTING	55.00	60.00	65.00	70.00	75.00	80.00	85.00	90.00	95.00	100.00	-6.10
	REF	55.55	60.55	65.58	70.51	75.42	80.27	85.09	89.90	94.60	98.98	
	%ERROR	1.00	0.92	0.89	0.73	0.56	0.34	0.11	-0.11	-0.42	-1.02	

REPORT QA GAS-CALIBRATOR (AFTER)

AIR FLOW (LPM)	SETTING	0.50	1.00	1.50	2.00	2.50	3.00	3.50	4.00	4.50	5.00	AVG
	REF	0.49	0.99	1.50	2.00	2.50	3.00	3.49	3.98	4.48	4.96	
	%ERROR	-2.00	-0.60	-0.07	0.00	0.16	0.07	-0.34	-0.55	-0.47	-0.90	
	SETTING	5.50	6.00	6.50	7.00	7.50	8.00	8.50	9.00	9.50	10.00	-0.45
	REF	5.45	5.94	6.45	6.95	7.46	7.98	8.50	9.00	9.50	10.00	
	%ERROR	-0.93	-1.07	-0.82	-0.69	-0.60	-0.24	0.00	0.00	0.00	0.00	

Gas FLOW (CCM)	SETTING	5.00	10.00	15.00	20.00	25.00	30.00	35.00	40.00	45.00	50.00	AVG
	REF	4.86	9.96	14.92	19.92	24.94	29.97	34.95	39.99	44.99	49.99	
	%ERROR	-2.80	-0.40	-0.53	-0.40	-0.24	-0.10	-0.14	-0.02	-0.02	-0.02	
	SETTING	55.00	60.00	65.00	70.00	75.00	80.00	85.00	90.00	95.00	100.00	-0.20
	REF	54.94	59.95	64.98	69.99	74.98	80.02	85.10	90.16	95.29	100.30	
	%ERROR	-0.11	-0.08	-0.03	-0.01	-0.03	0.02	0.12	0.18	0.31	0.30	

TEMPERATURE: 26.5 DEG.C
PRESSURE : 752 mmHg
TESTED BY : 
Mr. Kritsiek Jansangvattana



Aligas Specialty Gases
Aligas USA, LLC
6141 Eastern Road
Piquette, PA 19394
Aligas.com

CERTIFICATE OF ANALYSIS

Grade of Product: EPA Protocol

Part Number: E04N1995E15A2802
Cylinder Number: E80123127
Lot Number: 124 - Plumsteadville - PA
POVP Number: A12019
Gas Code: CO/NO NOX SO2 BALN
Reference Number: 160-01604074-1
Cylinder Volume: 144 ± CF
Cylinder Pressure: 2015 PSIG
Valve Outlet: 680
Certification Date: Oct 11, 2019
Expiration Date: Oct 11, 2027

Certification performed in accordance with EPA Testability Protocol for Assay and Certification of Commercial Calibration Gases. May 2019, Revision 1.3.1. This certificate is valid for the duration of the test. There are no significant impurities which affect the use of the calibration product. All outgas trends are on a volume/volume basis unless otherwise noted.

Do Not Use This Cylinder Below 100 PSIG At 0.2 MPa (3000 PSI).

ANALYTICAL RESULTS				
Component	Requested Concentration	Actual Concentration	Protocol Method	Total Relative Uncertainty
NOX	950.0 PPM	957.2 PPM	G1	+/-0.7% NIST Traceable
CARBON MONOXIDE	950.0 PPM	960.4 PPM	G1	+/-0.4% NIST Traceable
NITRIC OXIDE	950.0 PPM	957.2 PPM	G1	+/-0.7% NIST Traceable
SULFUR DIOXIDE	950.0 PPM	960.7 PPM	G1	+/-0.6% NIST Traceable
NITROGEN	Balance			
CALIBRATION STANDARDS				
Type	Lot ID	Cylinder No	Concentration	Uncertainty
NITRA	08016307	KAL00478	970.0 PPM CARBON MONOXIDE/NITROGEN	+/-0.4%
NITRA	08011732	KAL00381	970.0 PPM NITRIC OXIDE/NITROGEN	+/-0.6%
NITRA	08011732	KAL00381-NOX	970.0 PPM NITRIC OXIDE/NITROGEN	+/-0.6%
NITRA	11010039	KAL00465	968.0 PPM SULFUR DIOXIDE/NITROGEN	+/-0.6%
ANALYTICAL EQUIPMENT				
Analytical Principle				
Instrument/Make/Model	FTIR			
Triad Data Available Upon Request	FTIR			
Triad Data Available Upon Request	FTIR			
Triad Data Available Upon Request	FTIR			

NOTES: GROSS WEIGHT: 28.5 KG
NET WEIGHT: 4.5 KG





บริษัท ไคเนติกส์ คอร์ปอเรชั่น จำกัด

KINETICS CORPORATION LTD.

รายงานผลการสอบเทียบและใบเทียบคุณภาพเครื่องวัดความเข้มข้นก๊าซ

ลูกค้า : บริษัท เอส เอส (ประเทศไทย) จำกัด

รายชื่อผู้สอบเทียบ / เครื่องมือ : CO Analyzer

เลขประจำใบ / เครื่องมือ : T300

วันที่ : 20 กรกฎาคม 2566

วันที่ผู้ซื้อ : Telephone API

หมายเลขใบ / เครื่องมือ : 1895

MULTI POINT CALIBRATION REPORT

CUSTOMER NAME : SSS (Thailand) Co., Ltd

EQUIPMENT NAME : NO. Analyzer

MANUFACTURER : Tefotype - API MODEL : T300

STANDARD GAS CONCENTRATION (PPM) : 53.40

CYLINDER PRESSURE (kgf) : 1950

CERTIFIED BY : AIRGAS SPECIALTY GASES

SERIAL NO. : 2188

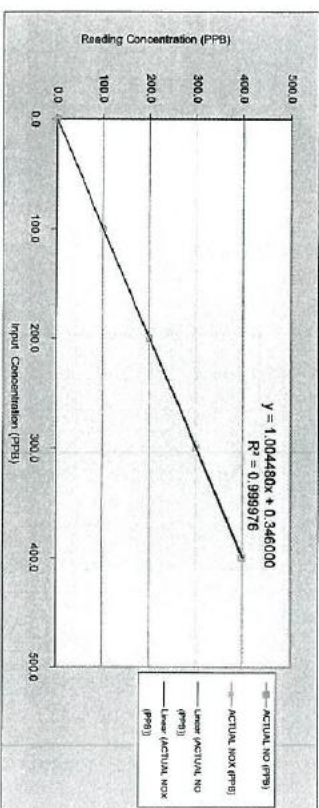
CYLINDER NO. : CCA45161

CERTIFIED DATE : Mar 10, 2021

EXPIRED DATE : Mar 10, 2029

CALIBRATION RESULTS

POINT NO	CALIBRATION RESULTS				
	IDEAL (PPM)	ACTUAL NO (PPM)	ERROR NO (PPM)	ACTUAL NO, (PPM)	% ERROR NO,
ZERO	0.0	0.0	0.0	0.0	0.0
1	100.0	100.8	0.8	101.0	1.0
2	200.0	200.6	-0.7	201.0	0.5
3	300.0	300.1	0.1	302.9	1.0
4	400.0	399.0	-1.0	401.3	0.3
AVERAGE (%)		0.4		0.7	



CALIBRATED BY : คุณวราณัฐพร

DATE : 20/03/2567

ผลการสอบเทียบและใบเทียบคุณภาพ : คุณวราณัฐพร โทรศัพท์ : 02-515-8987

เลขที่ 388 หมายเลขใบสอบเทียบและใบเทียบคุณภาพ : 10900 โทรศัพท์ : 0-2315-8988 โทรศัพท์ : 0-2315-8988 E-Mail : info@kinetics.co.th

API MODEL: T300	TEST VALUES	
	BEFORE	AFTER
1. RANGE	1 - 1000 PPM	50.0
2. STABILITY	≤ 1 PPM	0.009
3. CO MEASURE	2500 - 4800 mV	3077.5
4. CO REFERENCE	2000 - 4800 mV	3163.2
5. AIR RATIO	1.1 - 1.3	1.234
6. PRESSURE	25 - 35 in. Hg-A	29.3
7. SAMPLE FLOW	800 ± 10% cc/min	806
8. SAMPLE TEMP	45 ± 4 °C	45.5
9. BENCH TEMP	48 ± 2 °C	48.0
10. WHEEL TEMP	58 ± 2 °C	68.0
11. BOX TEMP	AMBIENT ± 5 °C	32.2
12. PHOT DRIVE	250 - 4750 mV	3310.2
13. CO SLOPE	1.0 ± 0.3	0.922
14. CO OFFSET	0.0 ± 0.3	0.024
15. CO READING (AMBIENT)	PPM	0.892
16. ELECTRICAL TEST	40 ± 2 PPM	1105.000
17. VOLTAGE TEST	+5V +12V +15V -15V	5.20 / 12.24 / 16.71 / -15.32
18. ZERO GAS	0.00 PPM	0.480
19. SPAN GAS	40.0 PPM	41.073

หมายเหตุ

- ใช้สารปรับ Spring 1 ชิ้น, Sealed Filter 1 ชิ้น, O-ring 2 ชิ้น

ผลการสอบเทียบและใบเทียบคุณภาพ : คุณวราณัฐพร โทรศัพท์ : 02-515-8987

เลขที่ 388 หมายเลขใบสอบเทียบและใบเทียบคุณภาพ : 10900



Airgas Specialty Gases
Airgas USA, LLC
8411 Eastern Road
Pittsburgh, PA 15244
Airgas.com

CERTIFICATE OF ANALYSIS

Grade of Product: EPA Protocol

Part Number: EOM190615A0822
Cylinder Number: C0745169
Laboratory: 124 - Pumasville - PA
PGVP Number: A12021
Gas Code: CO,NO,NOX,S02,BALN
Reference Number: 180-402045691-1
Cylinder Volume: 144.4 CF
Cylinder Pressure: 2015 PSIG
Valve Outlet: 680
Certification Date: Mar 10, 2021
Expiration Date: Mar 10, 2029

Certification performed in accordance with EPA 112 method for the analysis of Nitrogen Oxides (NOx) and Carbon Monoxide (CO) in gaseous samples. The analysis was performed using a calibrated gas analyzer. The results are reported in parts per million (PPM) by volume, dry basis, at standard conditions (15°C and 101.3 kPa). The uncertainty of the analysis is ±1.0% for NOx and ±0.5% for CO. The analysis was performed on a sample taken from the cylinder on the date of certification.

ANALYTICAL RESULTS			
Component	Requested Concentration	Actual Concentration	Total Relative Uncertainty
NOx	53.00 PPM	53.40 PPM	+/- 1.1% NIST Traceable
NITRIC OXIDE	53.00 PPM	53.40 PPM	+/- 1.1% NIST Traceable
SULFUR DIOXIDE	53.00 PPM	53.79 PPM	+/- 0.9% NIST Traceable
CARBON MONOXIDE	4500 PPM	4512 PPM	+/- 0.6% NIST Traceable
NITROGEN	Balance	Balance	+/- 0.6% NIST Traceable
ANALYTICAL RESULTS			
Type	Lot ID	Cylinder No	Expiration Date
NITM	07050227	E80079118	Jul 23, 2023
PRM	12385	E40000000	Feb 26, 2021
GNIS	12420689	C0320707	Feb 26, 2021
NITM	15010303	KAL000007	Aug 15, 2021
NITM	08012341	KAL0000716	Dec 23, 2021
The 3RM, PRM or AGM noted above is only in reference to the GMS label in the assay and not part of the analysis.			
ANALYTICAL EQUIPMENT			
Instrument/Make/Model			
Analytical Principle			
Model IS50 FTR AUP2010245 NO	NOx	FTIR	Feb 26, 2021
Model IS50 FTR AUP2010245 NO2	NO2	FTIR	Feb 26, 2021
Model IS50 FTR AUP2010245 SO2	SO2	FTIR	Feb 26, 2021

Trade Data Available Upon Request

NOTES:
Gross Weight: 28.1 Kg
Net Weight: 4.6 Kg

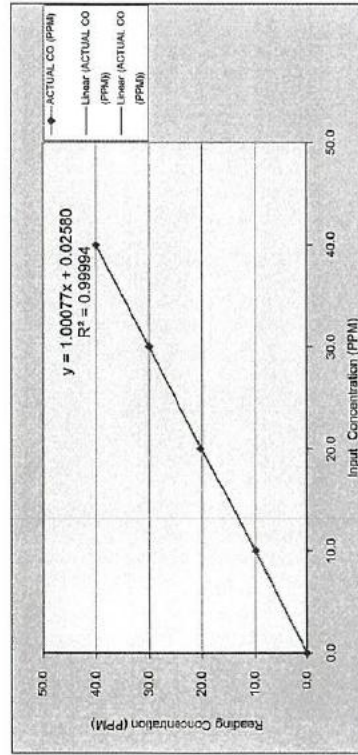


MULTI-POINT CALIBRATION REPORT

CUSTOMER NAME : SGS (Thailand) Co., Ltd.	
EQUIPMENT NAME : CO Analyzer	
MANUFACTURER : Teledyne - API	SERIAL NO : 1885
STANDARD GAS CONCENTRATION (PPM) : 4512	CYLINDER NO : C0745169
CYLINDER PRESSURE (psig) : 1420	CERTIFIED DATE : Mar 10, 2021
CERTIFIED BY : AIRGAS SPECIALTY GASES	EXPIRED DATE : Mar 10, 2029

CALIBRATION RESULTS

POINT NO	CALIBRATION RESULTS			
	IDEAL (PPM)	ACTUAL CO (PPM)	ERROR CO (PPM)	% ERROR CO
ZERO	0.00	0.002	0.002	0.00
1	10.00	9.939	-0.061	-0.610
2	20.00	20.251	0.251	1.255
3	30.00	30.008	0.008	0.027
4	40.00	40.006	0.006	0.015
AVERAGE (%)				
				0.476





บริษัท ไบเนติกส์ คอร์ปอเรชั่น จำกัด

KINETICS CORPORATION LTD.

โรงงานผลิตเครื่องวัดมลพิษทางอากาศ

ลูกค้า : บริษัท SCS (Thailand) Co., Ltd

รายละเอียด/ เครื่องมือ : NO_x Analyzer

ฟังก์ชัน/ เครื่องมือ : T200

วันที่ : 23 สิงหาคม 2566

บริษัท/ ชื่อ : Telephone API

หมายเลข/ เครื่องมือ : 2975

AA0417001

API MODEL: T200		TEST VALUES		BEFORE	AFTER
1	RANGE	50 - 20,000 PPB		500.0	500.0
2	STABILITY	≤ 1 PPB		0.2	0.1
3	SAMPLE FLOW	500 ± 10% ccm/min		488	516
4	DILOE FLOW	80 ± 10% ccm/min		78	82
5	PMT	mV		457.0	84.2
6	NOISE PMT	mV		510.9	25.6
7	A ZERO	-20 to 150 mV		270.7	47.9
8	HPDS	400 - 900 V		776	776
9	BOX CELL TEMP	50 ± 1 °C		50.0	50.0
10	BOX TEMP	AMBIENT ± 5 °C		34.7	34.7
11	PMT TEMP	7 ± 2 °C		7.5	7.5
12	MOXY TEMP	315 ± 5 °C		313.9	315.6
13	BOX CELL PRESSURE	<10 m - 10 µA		9.6	5.0
14	SAMPLE PRESSURE	25 - 35 m - 10 µA		29.3	29.3
15	NOX SLOPE	1.0 ± 0.3		1.519	0.990
16	NOX OFFSET	-50 to 150		260.5	1.2
17	NO SLOPE	1.0 ± 0.3		1.350	0.970
18	NO OFFSET	-50 to 150		257.0	-0.5
19	NO SAMPLE READING	PPB		158.0	0.3
20	NO2 SAMPLE READING	PPB		47.1	12.0
21	NOX SAMPLE READING	PPB		202.4	12.3
22	OPTIC TEST	2000 ± 1000 mV		1680.8	1546.4
23	ELECTRICAL TEST	2000 ± 1000 mV		2096.0	1141.7
24	VOLTAAGE TEST	+15 V -12 V +15 V -15 V		5.28 / 12.21 / 15.73 / 15.17	5.28 / 12.21 / 15.73 / 15.17
25	ZERO GAS NONOX	0.000/00 PPB		134.2 / 153.1	0.1 / 0.1
26	SPAN GAS NONOX	400.0/400.00 PPB		692.5 / 739.8	399.1 / 400.1

หมายเหตุ

- การปรับเทียบ Standard Flow 1 ขึ้น, 0 ถึง 2 ขึ้น, Standard 1 ขึ้น

- การทดสอบ A ZERO WARNING เมื่อจะทดสอบ PMT ให้ทดสอบ ทดสอบที่แทน CD PMT 1 แทน

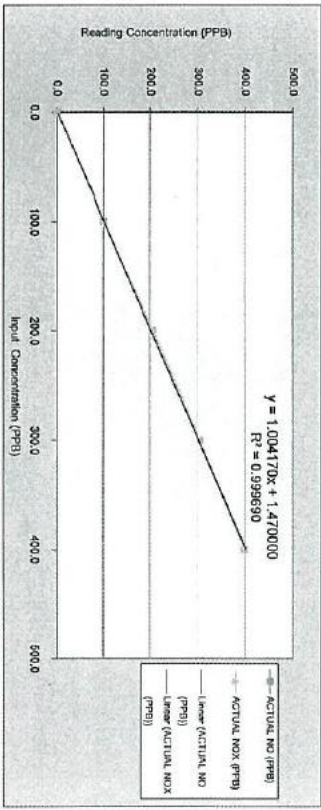
ห้องปฏิบัติการเครื่องมือวิทยาศาสตร์และเทคนิค อุตสาหกรรม
โทรศัพท์ 398 ถนนวิภาวดีรังสิต แขวงจตุจักร กรุงเทพฯ 10900 โทรทัศน์ 0-22

MULTI POINT CALIBRATION REPORT

CUSTOMER NAME : SCS (Thailand) Co., Ltd		MODEL : T200		SERIAL NO : 2975	
EQUIPMENT NAME : NO _x Analyzer		MANUFACTURER : Telephone - API		CYLINDER NO : CC745169	
STANDARD GAS CONCENTRATION (PPM) : 534.0		CYLINDER PRESSURE (kg) : 1400		CERTIFIED DATE : Mar 10, 2021	
CERTIFIED BY : AARCIS SPECIALTY GASES				EXPIRED DATE : Mar 10, 2029	

CALIBRATION RESULTS

POINT NO	CALIBRATION RESULTS			
	IDEAL (PPB)	ACTUAL NO (PPB)	ERROR NO (PPB)	% ERROR NO
ZERO	0.0	0.1	0.1	-
1	100.0	100.5	0.5	0.5
2	200.0	204.2	4.2	2.1
3	300.0	304.1	4.1	1.4
4	400.0	399.1	-0.9	-0.1
AVERAGE (%)			1.0	1.3



CALIBRATED BY : คุณพรชัย แก้วจันทร์

ข้อมูลการสอบเทียบเครื่องมือวัด : คุณพรชัย แก้วจันทร์ โทรทัศน์ : 02-515-9887

โทรศัพท์ 398 ถนนวิภาวดีรังสิต แขวงจตุจักร กรุงเทพฯ 10900 โทรทัศน์ 0-22

CERTIFICATE OF ANALYSIS
Grade of Product: EPA Protocol

Part Number:	EDAN19BE15A0832	Reference Number:	160-402045691-1
Cylinder Number:	CC7475169	Cylinder Volume:	144.4 CF
Laboratory:	124 - Plumsteadville - PA	Cylinder Pressure:	2015 PSIG
P/GP Number:	A12021	Valve Outlet:	660
Gas Code:	CO,NO,NOX,S02,BALN	Certification Date:	Mar 10, 2021
		Expiration Date:	Mar 10, 2029

Certification performed in accordance with EPA Traceability Protocol for Assay and Certification of Gaseous Calibration Standards (May 2012)* documents EPA 600/4-12-031, using the assay procedures listed. Analytical methodology does not require correction for analytical interference. The 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 standard. All concentrations are on a molal basis unless otherwise noted.

Do Not Use This Cylinder Below 100 psia i.e. 6.7 nonatmabs

Component	Requested Concentration	Actual Concentration	Protocol Method	Total Relative Uncertainty	Assay Dates
NOX	53.00 PPM	53.40 PPM	G1	+/- 1.1% NIST Traceable	03/03/2021, 03/10/2021
NITRIC OXIDE	53.00 PPM	53.40 PPM	G1	+/- 1.1% NIST Traceable	03/03/2021, 03/10/2021
NITROGEN DIOXIDE	53.00 PPM	53.75 PPM	G1	+/- 0.9% NIST Traceable	03/03/2021, 03/10/2021
CARBON MONOXIDE	45.00 PPM	45.12 PPM	G1	+/- 0.8% NIST Traceable	03/04/2021
TYPE	Balance				

CALIBRATION STANDARDS			
Type	Lot ID	Uncertainty	Expiration Date
NITRM	07080227		
NITRM	E00079116	+/- 1.0%	Jul 23, 2023
PMAS	DM86526		
QMS	12380	2.0%	Jul 20, 2020
QMS	12408839		
NITRM	C332707	2.1%	Aug 15, 2021
NITRM	KAL003087	+/-0.8%	Dec 23, 2021
NITRM	08012341	+/- 0.6%	Jun 07, 2024

This SERU, PMAS or NIST standard shown is only in reference to the assay and not used for the assay.

ANALYTICAL EQUIPMENT	
Instrument/Make/Model	Last Multipoint Calibration
SIEMENS ULTRAMAT 6 NITC575	Feb 18, 2021
Nicolet IS50 FTIR AUP2010245 NO2	Feb 18, 2021
Nicolet IS50 FTIR AUP2010245 NO2	Feb 22, 2021
Nicolet IS50 FTIR AUP2010245 SO2	Feb 18, 2021

Triad Data Available Upon Request

NOTES:
Gross Weight: 28.1 Kg
Net Weight: 4.6 Kg



KINETICS
Engineering that makes business that

Customer service report

บริษัท เอส ซี เอส (ประเทศไทย) จำกัด

Model	Equipment	Manufacturer
T200	NOx Analyzer	Teledyne API

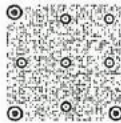
Quotation
Q-B2-2023-125-SV

● **Checking Date** ●

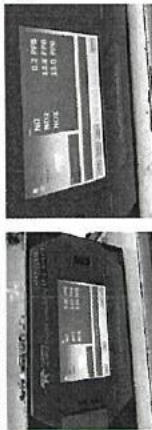
29/6/2023

● Problem

-ตรวจเช็คพบว่าเครื่องมีอาการ A ZERO WARNING เนื่องจากหลอด CD PMT เกือบหมดภาพ



contact us



● Correlation working / Remark

1. ทำการเปลี่ยนหลอด CD PMT
2. ทำการเปลี่ยนวัสดุในเบื่อง Sintered Filter, O-ring, Spring
3. จากบททดสอบการดองใช้งานเครื่อง *ด้วยสถานการณ์ทำจนปกติ

- Repair parts •

Sintered Filter 1 $\frac{1}{4}$ " U . O-ring 2 $\frac{1}{4}$ " U . Spring 1 $\frac{1}{4}$ " U

Technician



บริษัท ไนเนติกส์ จำกัด

KINETICS CORPORATION LTD.

รายงานผลการสอบและปรับเทียบอุปกรณ์ตรวจวัดคุณภาพอากาศ

ลูกค้า / บริษัท : SGS (Thailand) Co., Ltd.

รายชื่อผู้ปรับเทียบ : CO Analyzer

จำนวนอุปกรณ์ / เครื่องมือ : 1300

วันที่ : 20 พฤษภาคม 2566

บริษัทผู้ผลิต : Teledyne API

หมายเลขอุปกรณ์ / เครื่องมือ : 2550

Asan Voon

API MODEL T300		TEST VALUES	
		BEFORE	AFTER
1	RANGE	1 - 1000 PPM	50.0
2	STABILITY	≤ 1 PPM	0.00
3	CO MEASURE	2500 - 4600 mV	3494.4
4	CO REFERENCE	2000 - 4000 mV	2931.0
5	MR BATIO	1.1 - 1.3	-
6	PRESSURE	25 - 35 in. Hg-A	29.6
7	SCAFFE FLOW	800 ± 10% cfm/h	783.9
8	SCAFFE TEMP	48 ± 4 °C	44.7
9	BENCH TEMP	48 ± 2 °C	48.0
10	WHEEL TEMP	68 ± 2 °C	68.0
11	BOX TEMP	AMBIENT ± 5 °C	38.4
12	PFT DRIVE	250 - 4750 mV	-
13	CO SLOPE	1.0 ± 0.3	0.998
14	CO OFFSET	0.0 ± 0.3	-0.008
15	CO READING (AMBIENT)	PPM	0.21
16	ELECTRICAL TEST	40 ± 2 PPM	-
17	VOLTAJE TEST	+5V +15V -15V	5.23 / 12.21 / 16.58 / -16.17
18	ZERO GAS	0.00 PPM	-0.07
19	SPAN GAS	40.0 PPM	42.55

หมายเหตุ

- ใช้ทวนสปริง 1 ชิ้น, Standard Filter 1 ชิ้น, O-ring 2 ชิ้น

ผู้ดำเนินการสอบและปรับเทียบ : คุณวชิรวิทย์ วัฒนวิทย์
เบอร์ 388 หมายเลขประจำตัว : 02-515-6097

MULTI POINT CALIBRATION REPORT

CUSTOMER NAME : SGS (Thailand) Co., Ltd.

EQUIPMENT NAME : CO Analyzer

MANUFACTURER : Teledyne - API

STANDARD GAS CONCENTRATION (PPM) : 4512

CYLINDER PRESSURE (psig) : 1420

CERTIFIED BY : AIRGAS SPECIALTY GASES

MODEL : T300

SERIAL NO : 2550

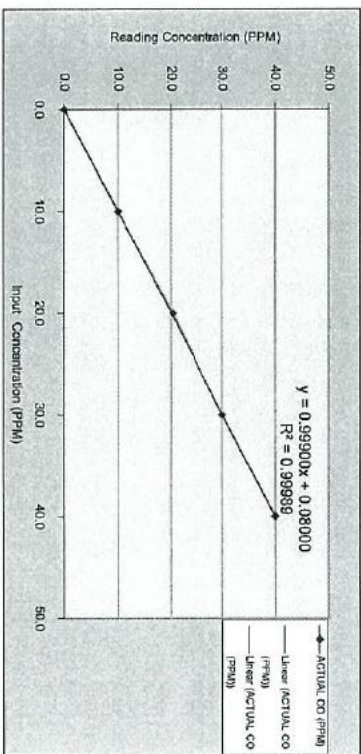
CYLINDER NO : CC/45159

CERTIFIED DATE : Mar 10, 2021

EXPIRED DATE : Mar 10, 2029

CALIBRATION RESULTS

POINT NO	CALIBRATION RESULTS		
	IDEAL (PPM)	ACTUAL CO (PPM)	% ERROR CO
ZERO	0.00	0.02	0.00
1	10.00	10.00	0.00
2	20.00	20.35	1.75
3	30.00	29.92	-0.27
4	40.00	40.01	0.02
AVERAGE (%)			0.51



CALIBRATED BY : คุณวชิรวิทย์ วัฒนวิทย์

ผู้ดำเนินการสอบและปรับเทียบ : คุณวชิรวิทย์ วัฒนวิทย์ โทรศัพท์ : 02-515-6097

เบอร์ 388 หมายเลขประจำตัว : 02-515-6097



Airgas Specialty Gases
Airgas USA, LLC
14440
Plymouth Road
Plymouth, PA 15449
Airgas.com

CERTIFICATE OF ANALYSIS

Grade of Product: EPA Protocol

Part Number: E04N69E15A0622
Cylinder Number: 180-40204691-1
Cylinder Volume: 144.4 CF
Laboratory: 124 - Plumsteadville - PA
PGVP Number: A12021
Gas Code: CO, NO, NOX, SO2, BALN
Valve Outlet: 660
Certification Date: Mar 10, 2021
Expiration Date: Mar 10, 2023

Certification performed in accordance with "EPA Testability Protocol for Airgas and Certification of Gaseous Calibration Standards" (May 2017) document EPA-821-R-17-010. This document describes the procedures for the use of this calibration mixture. This cylinder has a total analytical uncertainty as stated below when a confidence level of 95%. There are no significant impurities which affect the use of this calibration mixture. Air concentrations are on a Do Not Use This Cylinder below 100 ppb, i.e. 0.7 mg/m³ as a whole gas.

ANALYTICAL RESULTS				
Component	Requested Concentration	Actual Concentration	Total Relative Uncertainty	Assay Dates
NOX	53.00 PPM	53.45 PPM	+/- 1.1% NIST Traceable	03/03/2021, 03/10/2021
NITRIC OXIDE	53.00 PPM	53.45 PPM	+/- 1.1% NIST Traceable	03/03/2021, 03/10/2021
SULFUR DIOXIDE	53.00 PPM	53.75 PPM	+/- 0.9% NIST Traceable	03/03/2021, 03/10/2021
CARBON MONOXIDE	4500 PPM	4512 PPM	+/- 0.6% NIST Traceable	03/04/2021
NITROGEN	Balance		+/- 0.6% NIST Traceable	
CALIBRATION STANDARDS				
Type	Lot ID	Cylinder No	Concentration	Expiration Date
NTRM	07060227	EB0707116	100.3 PPM NITRIC OXIDE/NITROGEN	Jul 23, 2023
PRM	12386	DB6025	9.91 PPM AMMONIAC/NITROGEN DIOXIDE	Jul 23, 2023
GNIS	12420689	CC32707	4.025 PPM NITROGEN DIOXIDE/NITROGEN	Aug 15, 2021
NTRM	16010203	KAL000037	97.89 PPM SULFUR DIOXIDE/NITROGEN	Dec 15, 2021
NTRM	06012341	KAL004716	4857 PPM CARBON MONOXIDE/NITROGEN	Jun 07, 2024
The SEM, PRM or GNM listed above is only in reference to the GMS used in the assay and not part of the assay.				
ANALYTICAL EQUIPMENT				
Instrument/Make/Model	Last Multipoint Calibration			
SIEMENS ULTRAMAT 6 NITRO379	Feb 26, 2021			
Nicola ISSO FTIR AUP2010245 NO	Feb 16, 2021			
Nicola ISSO FTIR AUP2010245 NO2	Feb 22, 2021			
Nicola ISSO FTIR AUP2010245 SO2	Feb 16, 2021			

Notes

Gross Weight: 28.1 Kg
Net Weight: 4.6 Kg



บริษัท ไคเนติกส์ คอร์ปอเรชั่น จำกัด
KINETICS CORPORATION LTD.

บริษัท ไคเนติกส์ คอร์ปอเรชั่น จำกัด

ผู้ค้า / ผู้ขาย : SGS (Thailand) Co., Ltd.
รายละเอียด / รายละเอียด : CO Analyzer
รุ่น / รุ่น : T300
หมายเลขรุ่น / หมายเลข : 5981

TEST VALUES		BEFORE	AFTER
1	RANGE	1 - 1000 PPM	50.0
2	STABILITY	≤ 1 PPM	0.01
3	CO MEASURE	2500 - 4800 mV	3815
4	CO REFERENCE	2000 - 4800 mV	3361
5	AIR RATIO	1.1 - 1.3	1.10
6	PRESSURE	25 - 35 in - Hg A	28.9
7	SAMPLE FLOW	800 ± 10% cc/min	927
8	SAMPLE TEMP	46 ± 4 °C	46.5
9	BENCH TEMP	46 ± 2 °C	46
10	WHEEL TEMP	68 ± 2 °C	68
11	BOX TEMP	AMBIENT ± 5 °C	37.4
12	PHT DRIVE	250 - 4750 mV	2430
13	CO SLOPE	1.0 ± 0.3	1.059
14	CO OFFSET	0.0 ± 0.3	-0.049
15	CO READING (AMBIENT)	PPM	0.732
16	ELECTRICAL TEST	40 ± 2 PPM	40.3
17	VOLTAGE TEST	+5 V +12 V +15 V -15 V	5.24/12.15/16.25/-15.25
18	ZERO GAS	0.00 PPM	-0.306
19	SPAN GAS	40.0 PPM	40.341

หมายเหตุ

- น้ำหนักเบ้าเบ้า Sealed Filter 1 ชิ้น, Spring 1 ชิ้น, O-ring 2 ชิ้น
- Filter California M-10-Point

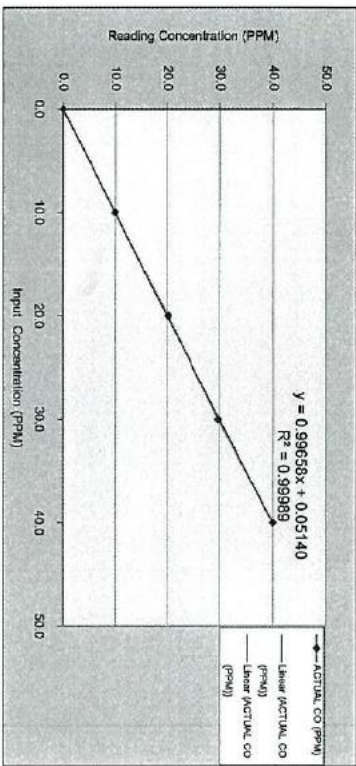
ข้อมูลการวิเคราะห์
เลขที่ 598 หมายเลข

MULTI POINT CALIBRATION REPORT

CUSTOMER NAME : SGS (Thailand) Co., Ltd.		
EQUIPMENT NAME : CO Analyzer		
MANUFACTURER : Teledyne - API	MODEL : T300	SERIAL NO : 5881
STANDARD GAS CONCENTRATION (PPM) :	4512	CYLINDER NO : CC745169
CYLINDER PRESSURE (psig) :	1550	CERTIFIED DATE : Mar 10 2021
CERTIFIED BY : AIRGAS SPECIALTY GASES		EXPIRED DATE : Mar 10 2029

CALIBRATION RESULTS

POINT NO	CALIBRATION RESULTS		
	REFL (PPM)	ACTUAL CO (PPM)	% ERROR CO
ZERO	0.00	0.004	0.00
1	10.00	9.932	-0.680
2	20.00	20.198	0.198
3	30.00	29.724	-0.276
4	40.00	39.997	-0.003
AVERAGE (%)			0.549



CALIBRATED BY : คุณสมาน งามระพ

ข้อมูลการซ่อมบำรุงจากท่านขอคืนทรัพย์สิน : คุณสมาน งามระพ โทรศัพท์ : 02-515-8987

DATE : 16/02/2567

เครื่อง 308 พบปัญหาจากแรงดันแก๊สลดลง สาเหตุเกิดจากวาล์ว 10000 โทรศัพท์ : 0-2515-8999 โทรสาร : 0-2515-8988 E-Mail : info@kinetics.co.th

KINETICS
ENGINEERING SERVICE KINETICS LTD

Customer service report

บริษัท เคทีเอส จำกัด (มหาชน) จำกัด

Manufacturer
Teledyne API
Equipment
CO Analyzer
Model
T300

S/N
Quotation

5881

Checking Date

16/02/2567

Problem



B2

contact us



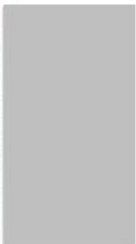
Correlation workers / Remark

1. ทดสอบเปลี่ยน Sintered Filter 1 ชิ้น , Spring 1 ชิ้น O-ring 2 ชิ้น
2. ทดสอบ Calibrate Multi-point

Repair parts

Sintered Filter 1 ชิ้น , Spring 1 ชิ้น , O-ring 2 ชิ้น

Technician / Engineer





บริษัท ไคเนติกส์ คอร์ปอเรชั่น จำกัด

KINETICS CORPORATION LTD.

รายงานผลการซ่อมและปรับเทียบอุปกรณ์ตรวจวัดคุณภาพอากาศ

ลูกค้า : บริษัท SGS (Thailand) Co., Ltd.
รายละเอียด : เครื่องมือ : NO_x Analyzer
วันที่ : 16 กุมภาพันธ์ 2567
บริษัทผู้ผลิต : Tedyne API
หมายเลขประจำตัว / เครื่องมือ : T200

TEST VALUES			BEFORE	AFTER
1	RANGE	50 - 20,000 PPB	500.0	500.0
2	STABILITY	≤ 1 PPB	0.31	0.12
3	SAMPLE FLOW	500 ± 10% c/min	494	492
4	OZONE FLOW	80 ± 10% c/min	87	79
5	PMAT	mV	178.4	137.0
6	NORM PMT	mV	-2.2	1.2
7	A ZERO	-20 To 150 mV	147.1	134.7
8	IPVS	-400 - 900 V	660	660
9	FX CELL TEMP	50 ± 1 °C	50.1	49.9
10	BOX TEMP	AMBIENT ± 5 °C	29.2	31.7
11	PMAT TEMP	7 ± 2 °C	6.8	6.8
12	MAV TEMP	315 ± 5 °C	316.0	315.0
13	FX CELL PRESSURE	< 10 in. -Hg-A	4.5	4.3
14	SAMPLE PRESSURE	25 - 35 in. -Hg-A	28.6	28.8
15	NOX SLOPE	1.0 ± 0.3	1.034	1.014
16	NOX OFFSET	-50 To 150	20.4	5.4
17	NO SLOPE	1.0 ± 0.3	1.002	1.001
18	NO OFFSET	-50 To 150	-0.2	-0.7
19	NO SAMPLE READING	PPB	-0.8	1.0
20	NO2 SAMPLE READING	PPB	5.5	7.3
21	NOX SAMPLE READING	PPB	4.7	8.3
22	OPTIC TEST	2000 ± 1000 mV	2628.0	2629.0
23	ELECTRICAL TEST	2000 ± 1000 mV	2665.0	2665.0
24	VOLTAGE TEST	-5V +12V +15V -15V	5.08 11.99 15.27 -15.16	5.25 12.10 15.29 -15.17
25	ZERO GAS NONOX	0.000.00 PPB	-2.1 / 2.8	0.0 / 0.0
26	SPAN GAS NONOX	400.00/400.00 PPB	403.0 / 402.8	403.0 / 402.9

หมายเหตุ

- ใช้สารเคมี Spanned Filter 3 วัน, Spring 3 วัน, O-ring 6 วัน

- ใช้สาร Calibrate Multi Point

ผลการปรับเทียบแล้ว
เลขที่ 388 ตามวิธีการ

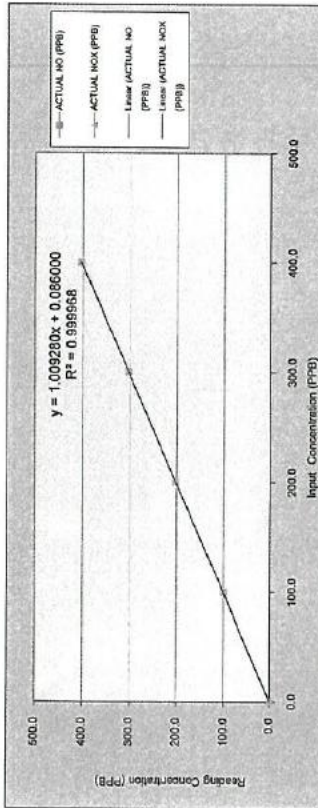
โทร 0908 E-Mail : info@kinetics.co.th

MULTI-POINT CALIBRATION REPORT

CUSTOMER NAME : SGS (Thailand) Co., Ltd.	
EQUIPMENT NAME : NO _x Analyzer	
MANUFACTURER : Tedyne - API	MODEL : T200
SERIAL NO : 7533	
CYLINDER NO : C0745169	
STANDARD GAS CONCENTRATION (PPM) : 53.40	
CERTIFIED DATE : Mar 10, 2021	
EXPIRED DATE : Mar 10, 2029	

CALIBRATION RESULTS

POINT NO	CALIBRATION RESULTS			
	REAL (PPB)	ACTUAL NO (PPB)	ERROR NO (PPB)	% ERROR NO
ZERO	0.0	0.0	0.0	0.0
1	100.0	100.6	0.6	0.1
2	200.0	202.1	2.1	0.3
3	300.0	304.0	4.0	1.3
4	400.0	403.0	3.0	0.8
AVERAGE (%)				0.9



CALIBRATED BY : คุณสมชาย วัฒนา

ต้องการข้อมูลทางด้านเทคนิคเพิ่มเติม : กรุณาโทร มาหาเรา โทรที่ : 02-515-6987

DATE : 15/02/2566

เลขที่ 388 ตามวิธีการตามมาตรฐานกรมการขนส่งทางบก 10900 โทรที่ : 0-2515-9999 โทรสาร : 0-2515-9989 E-Mail : info@kinetics.co.th



Customer service report

Manufacturer
Teledyne API

Equipment
NOx Analyzer

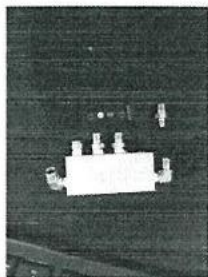
Quotation

Model
T200

S/N
7533

Checking Date
16/02/2567

Problem



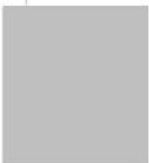
contact us

- Correlation working / Remark
- 1. ฟิล์มสัณเฑาะว์ Sintered Filter 3 ฟิล์ม, Spring 3 ฟิล์ม O-ring 6 ฟิล์ม
- 2. ฟิล์ม Calibrate Multi-point

Repair parts

Sintered Filter 3 ฟิล์ม, Spring 3 ฟิล์ม, O-ring 6 ฟิล์ม

Technician / Engineer



4141000220000

บริษัท ไคเนติกส์ คอร์ปอเรชั่น จำกัด

KINETICS CORPORATION LTD.

โรงงานการผลิตและประกอบชิ้นส่วนอุปกรณ์วัดก๊าซมลพิษทางอากาศ

ลูกค้า / ลูกค้า : SGS (Thailand) Co., Ltd.
ตราผลิตภัณฑ์ / ผลิตภัณฑ์ : NOx Analyzer
รุ่นอุปกรณ์ / รุ่นสินค้า : T200

วันที่ : 16 กุมภาพันธ์ 2567
บริษัทผู้ขาย : Teledyne API
หมายเลขอุปกรณ์ / รหัสสินค้า : 7534

API MODEL T200		TEST VALUES	
		BEFORE	AFTER
1	RANGE	50 - 20,000 PPB	500.0
2	STABILITY	≤ 1 PPB	0.02
3	SAMPLE FLOW	500 ± 10%, c/min	476
4	OZONE FLOW	80 ± 10% c/min	672
5	PMF	mV	83
6	NORM PMT	mV	23.1
7	A ZERO	-20 TO 150 uV	-0.8
8	B HVPS	400 - 900 V	23.7
9	BOX CELL TEMP	50 ± 1 °C	650
10	BOX TEMP	AIRBENT ± 5 °C	50.0
11	PMF TEMP	7 ± 2 °C	32.4
12	MULTI TEMP	315 ± 5 °C	7.0
13	BOX CELL PRESSURE	<10 in - HgA	314.6
14	SAMPLE PRESSURE	25 - 35 in - HgA	315.1
15	NOX SLOPE	1.0 ± 0.3	4.5
16	NOX OFFSET	-50 TO 150	28.7
17	NO SLOPE	1.0 ± 0.3	0.944
18	NO OFFSET	-50 TO 150	16.5
19	NO SAMPLE READING	PPB	0.807
20	NO2 SAMPLE READING	PPB	-0.70
21	NOX SAMPLE READING	PPB	-0.60
22	OPTIC TEST	2000 ± 1000 mV	0.2
23	ELECTRICAL TEST	2000 ± 1000 mV	2627.0
24	KOLIDGE TEST	-4.5 V -12 V -15 V	2615.0
25	ZERO GAS NONOX	0.000/0.00 PPB	5.24/17.04/15.35/15.16
26	SPAN GAS NONOX	400.00/900.00 PPB	0.2/1.2/4
หมายเหตุ		397.6/496.1	0.0/0.0
- PMF Temp Warning ตรวจพบอุณหภูมิ TEC Cooler Drive BD			
- ฟิล์มสัณเฑาะว์ Sintered Filter 3 ฟิล์ม, Spring 3 ฟิล์ม O-ring 6 ฟิล์ม			
- ฟิล์ม Calibrate Multi-point			

ข้อมูลการวัดและผลการวิเคราะห์ทางเคมี ก๊าซ
ตามข้อกำหนดของกรมโรงงานอุตสาหกรรม กระทรวงอุตสาหกรรม
เลขที่ 388 กรมโรงงานอุตสาหกรรม กรุงเทพมหานคร โทร : 0-2515-8888 E-Mail : info@kinetics.co.th

MULTI POINT CALIBRATION REPORT

CUSTOMER NAME : SGS (Thailand) Co., Ltd.

EQUIPMENT NAME : NO_x Analyzer

MANUFACTURER : Teledyne API

MODEL : T200

53.4

STANDARD GAS CONCENTRATION (PPM) :

CYLINDER PRESSURE (psig) :

1550

CERTIFIED BY : AIRGAS SPECIALTY GASES

SERIAL NO : 7534

CYLINDER NO : GC745169

CERTIFIED DATE : Mar 10, 2021

EXPIRED DATE : Mar 10, 2029

CALIBRATION RESULTS

CALIBRATION RESULTS							
POINT NO	IDEAL (PPH)	ACTUAL NO (PPH)	ERROR NO (PPH)	% ERROR NO	ACTUAL NO _x (PPH)	ERROR NO _x (PPH)	% ERROR NO _x
ZERO	0.0	0.0	0.0	0.0	0.0	0.0	0.0
1	100.0	99.4	-0.6	-0.6	99.6	-0.4	-0.4
2	200.0	200.9	0.9	0.5	202.6	2.6	1.3
3	300.0	300.7	0.7	0.2	301.5	1.5	0.5
4	400.0	397.6	-2.4	-0.6	400.1	0.1	0.0
AVERAGE (%)				0.5			
0.6							

$y = 1.002100x + 0.340000$
 $R^2 = 0.999942$

Reading Concentration (PPH)

Input Concentration (PPH)

Legend:

- Actual NO (PPH)
- Actual NO_x (PPH)
- Linear (ACTUAL NO (PPH))
- Linear (ACTUAL NO_x (PPH))

CALIBRATED BY : คุณนพพร เหมกรวย

DATE : 15/02/2567

ข้อมูลการปฏิบัติงานเทคนิคเพิ่มเติม : คุณนพพร เหมกรวย โทรศัพท์ : 02-515-8987

เลขที่ 300 ถนนรัชดาภิเษก แขวงจันทน์นาบอน เขตจตุจักร กรุงเทพฯ 10000 โทรศัพท์ : 0-2515-8989 โทรสาร : 0-2515-8988 E-Mail : info@kinetics.co.th



Customer service report

บริษัท เค จี เอส (ประเทศไทย) จำกัด

Manufacturer
Teledyne API

Equipment
NOx Analyzer

Model
T200

S/N
7534

Quotation
Q-82-2024-038-SV

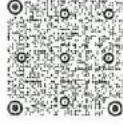
● Checking Date ●

16/02/2567

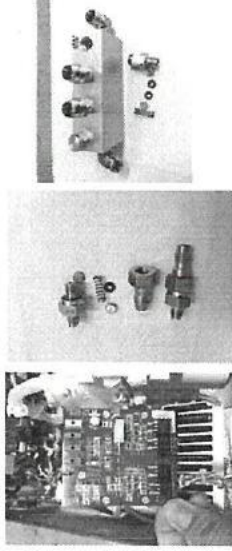
● Problem

- แจ้งเหตุ PMT Temp Warning ค่าลดลง -2.5

B2



contact us



● Correlation working / Remark

1. PMT Temp Warning ทำการเปลี่ยน TEC Cooler Driver BD
2. ทำการเปลี่ยน Sintered Filter 3 ชิ้น , Spring 3 ชิ้น O-ring 6 ชิ้น
3. ทำการ Calibrate Multi-point

● Repair parts ●

Sintered Filter 3 ชิ้น , Spring 3 ชิ้น , O-ring 6 ชิ้น

Technician / Engineer



April 2006

บริษัท ไคเนติกส์ คอร์ปอเรชั่น จำกัด

KINETICS CORPORATION LTD.

รายงานผลการร่วมและได้รับพินิจจากหน่วยงานราชการ

ลูกค้า / ผู้ควบคุม : SGS (Thailand) Co., Ltd.

รหัสลูกค้า / เครื่องมือ : NO_x Analyzer

วันที่ : 16 กุมภาพันธ์ 2547

พินิจจากลูกค้า / เครื่องมือ : 7535

พินิจจากลูกค้า / เครื่องมือ : 7535

TEST VALUES		BEFORE	AFTER
1	RANGE	50 - 20,000 PPB	500.0
2	STABILITY	≤ 1 PPB	0.91
3	SAMPLE FLOW	500 ± 10% cc/min	465
4	OZONE FLOW	80 ± 10% cc/min	101
5	PMF	mV	163.4
6	NORM PMF	mV	23.7
7	A ZERO	-20 to 150 mV	145.0
8	HVPS	400 - 900 V	625
9	BOX CELL TEMP	50 ± 1 °C	50.2
10	BOX TEMP	AMBIENT ± 5 °C	32.5
11	PMF TEMP	7 ± 2 °C	6.7
12	WCLV TEMP	315 ± 5 °C	316.0
13	BOX CELL PRESSURE	<10 in-Hg-A	4.4
14	SAMPLE PRESSURE	25 - 35 in-Hg-A	28.5
15	NOX SLOPE	1.0 ± 0.3	1.024
16	NOX OFFSET	-50 to 150	21.4
17	NO SLOPE	1.0 ± 0.3	0.983
18	NO OFFSET	-50 to 150	-0.7
19	NO SAMPLE READING	PPB	9.5
20	NOX SAMPLE READING	PPB	0.7
21	NOX SAMPLE READING	PPB	10.3
22	OPTIC TEST	2000 ± 1000 mV	1500.0
23	ELECTRICAL TEST	2000 ± 1000 mV	2591.0
24	WCLVAGE TEST	+5 V +12 V +16 V -15 V	5.24 / 12.18 / 15.52 / 15.20
25	ZERO GAS NONOX	0.000.00 PPB	-1.2 / 9.5
26	SPAN GAS NONOX	400.0000.00 PPB	421.4 / 418.5

หมายเหตุ

- การปรับเทียบ Power Supply 12Vdc ไม่ได้ออกค่าที่ผู้ใช้พบได้

- การปรับเทียบ Spanned Flow 3 ลิตร, Spanned 3 ลิตร, Ozone 6 ลิตร

- การปรับเทียบ Multi-point

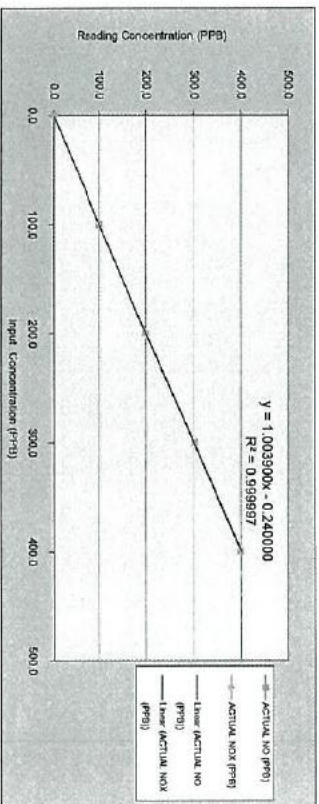
การควบคุมคุณภาพและมาตรฐานภายใน หน่วยงาน
บริษัท SGS (Thailand) Co., Ltd. เลขที่ 388 ถนนพหลโยธิน แขวงจตุจักร เขตจตุจักร กรุงเทพมหานคร 10000 โทรศัพท์ : 0-2515-8888 โทรสาร : 0-2515-8889 E-Mail : info@sgs.co.th

MULTI POINT CALIBRATION REPORT

CUSTOMER NAME : SGS (Thailand) Co., Ltd.		SERIAL NO : 7535	
EQUIPMENT NAME : NO _x Analyzer		CYLINDER NO : CG745169	
MANUFACTURER : Teledyne API		CERTIFIED DATE : Mar 10, 2021	
MODEL : 7200		EXPIRED DATE : Mar 10, 2023	
STANDARD GAS CONCENTRATION (PPM) : 53.40			
CYLINDER PRESSURE (PSI) : 1550			
CERTIFIED BY : AIRGAS SPECIALTY GASES			

CALIBRATION RESULTS

POINT NO		CALIBRATION RESULTS			
REFL (PPM)	ACTUAL NO (PPM)	ERROR NO (PPM)	% ERROR NO	ACTUAL NO ₂ (PPM)	% ERROR NO ₂
ZERO	0.0	0.0	0.0	0.0	0.0
1	100.0	99.7	-0.3	99.8	-0.20
2	200.0	199.5	-0.5	200.4	0.4
3	300.0	301.0	1.0	301.3	1.3
4	400.0	399.4	-0.6	401.2	1.2
AVERAGE (%)			0.3		0.3



CALIBRATED BY : คุณชาย ภาณุ

DATE : 16 APR 2547

การควบคุมคุณภาพและมาตรฐานภายใน หน่วยงาน

บริษัท SGS (Thailand) Co., Ltd. เลขที่ 388 ถนนพหลโยธิน แขวงจตุจักร เขตจตุจักร กรุงเทพมหานคร 10000 โทรศัพท์ : 0-2515-8888 โทรสาร : 0-2515-8889 E-Mail : info@sgs.co.th



Customer service report

บริษัท เคที จี เอส (ประเทศไทย) จำกัด

Manufacturer
Teledyne API

Equipment
NOx Analyzer

Model
T200

SN
7535

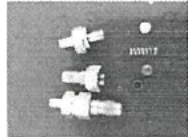
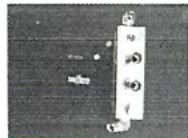
Quotation
Q-82-2024-037-SV

Checking Date

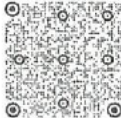
16/02/2567

Problem

- พบปัญหา 12vdc. เมื่อเสียบปลั๊กใช้ไม่ได้



B2



contact us



Corelation working / Remark

1. ทำการเปลี่ยน Power Supply 12vdc.
2. ทำการเปลี่ยน Sintered Filter 3 ชิ้น , Spring 3 ชิ้น O-ring 6 ชิ้น
3. ทำการ Calibrate Multi-point

Repair parts

Sintered Filter 3 ชิ้น , Spring 3 ชิ้น , O-ring 6 ชิ้น

Technician / Engineer



THAI METEOROLOGICAL DEPARTMENT

4353 Sukhumvit, Bangna, Bangkok 10260 Tel. 081-454-2804, 0-2399-0469

Calibration Certificate



Issued by : Calibration & Test Section : Meteorological Instruments Bureau

Date of Issue : 31 May, 2024 Certification No. 222/24

Page : 1 of 6

Object : Precision Weather Station

Manufacturer : Davis Instruments

Type : Vanlage Pro 2 Model No. : 6152C

Mfg Code : Display AK130020038 Transmitter A111101P020

Customer : SGS (Thailand) Limited.
100 Nanglinchee Road, Chongnonsi,
Yamawa, Bangkok 10120.

Calibration Condition : Temperature 25.1, °C Barometric Pressure 1008.6 hPa

NATIONAL STANDARD WIND TUNNEL : Wind Aloit Plotting Board

: Micromanometer Theodor Friedrichs FC014 Serial No. 9310119 : HOOK GAGE NO 1425

N.I.S.T. Test Reference Number 731/241460 : Standard Velocity at 20 - 30 m/sec

: Ultrasonic Anemometer Model DA-650-3TV (sensor TR-90AH)

Serial Number 110730029 (sensor 120629680)

JAPAN QUALITY ASSURANCE ORGANIZATION : Standard Velocity at 0 - 20 m/sec

STANDARD THERMOMETER : Theodor Friedrich : Dry No.8390/94 Wet No. 8390/94



The Result of Calibration

31 May, 2024
Certification No. 222/24
Page : 2 of 6

Standard	HOOK GAGE NO. 1425			TESTED ANEMOMETER	
	Pressure	Vacuum	Velocity	Velocity	Correction
Ultrasonic Anemometer	inches H2O	inches H2O	in/sec	in/sec	in/sec
1.00	-	-	-	0.9	0.10
3.02	-	-	-	2.7	0.32
5.00	-	-	-	4.9	0.10
7.00	-	-	-	6.7	0.30
9.02	-	-	-	8.9	0.12
11.01	-	-	-	10.7	0.31
13.01	-	-	-	13.0	0.01
15.01	-	-	-	14.7	0.31
17.02	-	-	-	17.0	0.02
20.02	-	-	-	19.3	0.22

Wind Alert Flooding Board.	
US DEPARTMENT OF COMMERCE WEATHER BUREAU	
WIND DIRECTION	TESTED WIND DIRECTION
0	0
90	90
180	180



The Result of Calibration

31 May, 2024
Certification No. 222/24
Page : 3 of 6

Standard Barometer	Tested Barometer	Correction
Pressure	Pressure	
753.08	754.8	-1.72
753.80	754.9	-1.10
753.92	755.0	-1.08
754.06	755.1	-1.04
754.69	755.8	-1.11
754.76	755.9	-1.14
755.17	756.2	-1.03
755.33	756.5	-1.17
755.45	756.6	-1.15
755.50	756.5	-1.00
754.28	755.4	-1.12
754.78	755.9	-1.12
753.98	755.1	-1.12
754.35	755.5	-1.15
754.69	755.8	-1.11
755.37	756.4	-1.03
755.70	756.8	-1.10
755.75	756.9	-1.15
755.90	757.0	-1.10
756.08	757.2	-1.12

The Result of Calibration

31 May, 2024

Certification No. 222/24

Page : 4 of 6

Standard Temp. °C	Temperature Sensor	
	Reading °C	Correction °C
45.2	45.4	-0.2
30.5	30.7	-0.2
15.6	15.7	-0.1

The Result of Calibration

31 May, 2024

Certification No. 222/24

Page : 5 of 6

Standard Humidity % R.H.	Relative Humidity Sensor	
	Reading % R.H.	Correction % R.H.
86.32	90	-3.68
67.54	70	-2.46
46.23	47	-0.77



Date of Issue 31 May, 2024

Certification No. 222/24

Page: 6 of 6

ใบรับรอง

หนังสือฉบับนี้ขอรับรองว่า เครื่องวัดฝน ตีหือ Davis Instruments แบบ TIPPING
BUCKET Product No. 6152CUK Mfg. Code: A111101 P1020 ที่การสอบเทียบกันแก้ววัดฝน
แบบถ้วยตวง GAUGE DIAMETER 8.0 INCHES, NEGRETTI & ZAMBRA LONDON No.
71082 และสามารถนำไปใช้ได้ มีค่าถูกต้องจนรายละเอียดของเครื่องมือ (0.2 mm/TIP)



หน้า 12/910



THAI METEOROLOGICAL DEPARTMENT
4353 Sukhumvit, Bangna, Bangkok 10260 Tel. 081-451-2804/2399-9469
Calibration Certificate

Issued by : Calibration & Test Section : Meteorological Instruments Bureau

Date of Issue 7 February, 2024

Certification No. 076/24

Page : 1 of 6

Object : Precision Weather Station

Manufacturer : Davis Instruments

Model No. : 6152C Model No. : 6152C

Mfg Code : Display AZ170618031 Transmitter BD190415074

Customer : SGS (Thailand) Limited,

100 Nanglinchee Road, Chongnonsi,
Yamewa, Bangkok 10120.

Calibration Condition : Temperature 25.1 °C Barometric Pressure 1011.3 hPa

NATIONAL STANDARD WIND TUNNEL : Wind A101 Floating Board

: Micromanometer Theodor Friedrichs PCD14 Serial No. 8310119 : HOOK GAGE NO 1425

N.I.S.T. Test Reference Number 731/241400 : Standard Velocity at 20 - 30 m/sec

: Ultrasonic Anemometer Model DA-650-3TV (sensor TR-90A1-1)

Serial Number 110730029 (sensor 120820586)

JAPAN QUALITY ASSURANCE ORGANIZATION : Standard Velocity at 0 - 20 m/sec

STANDARD THERMOMETER : Theodor Friedrich : Dry No.839094 Wet No. 838994



The Result of Calibration



The Result of Calibration

Standard Ultrasonic Anemometer m/sec	HOOK GAGE NO. 1425		TESTED ANEMOMETER	
	Pressure inches H2O	Vacuum inches H2O	Velocity m/sec	Correction m/sec
1.00	-	-	0.9	0.10
3.02	-	-	3.0	0.02
5.00	-	-	4.9	0.10
7.00	-	-	7.0	0.00
9.02	-	-	9.0	0.02
11.01	-	-	11.1	-0.09
13.01	-	-	13.0	0.01
15.01	-	-	15.1	-0.09
17.02	-	-	17.0	0.02
20.02	-	-	20.1	-0.08

Wind Aloft Plotting Board.	
US. DEPARTMENT OF COMMERCE WEATHER BUREAU	
WIND DIRECTION	TESTED WIND DIRECTION
0	0
90	90
180	180
270	270

Standard Barometer Pressure	Tested Barometer Pressure	Correction
759.19	759.3	-1.11
759.01	759.1	-1.09
758.84	759.8	-0.96
759.19	760.2	-1.01
759.29	760.3	-1.01
759.25	760.4	-1.15
759.65	760.7	-1.06
759.77	760.9	-1.13
760.20	761.3	-1.10
760.88	761.6	-0.92
761.90	763.1	-1.20
762.06	763.2	-1.12
761.96	763.0	-1.04
761.83	762.9	-1.07
756.69	759.8	-1.11
756.91	760.1	-1.19
759.11	760.2	-1.09
759.67	760.8	-1.13
759.98	760.9	-0.92
760.18	761.1	-0.92



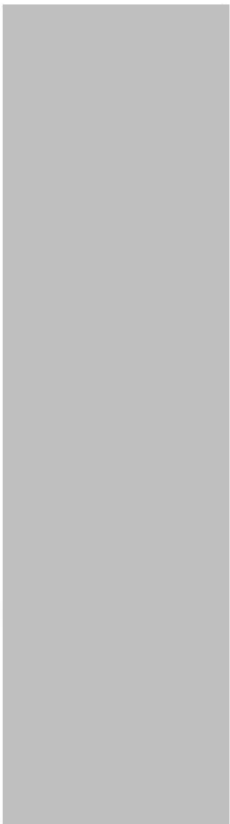
THAI METEOROLOGICAL DEPARTMENT

4353 Sukhumvit, Bangna, Bangkok 10260 Tel. 081-454-2804, 0-2399-0469

The Result of Calibration

7 February, 2024 Certification No. 07624
Page : 4 of 6

Standard Temp. °C	Temperature Sensor Reading	
	Reading °C	Correction °C
45.3	45.3	0.0
30.2	30.3	-0.1
15.8	15.7	0.1



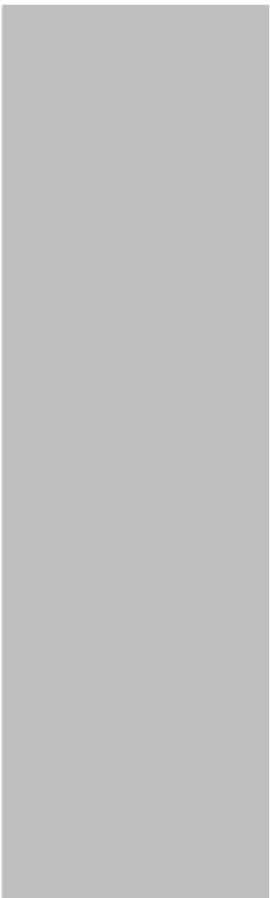
THAI METEOROLOGICAL DEPARTMENT

4353 Sukhumvit, Bangna, Bangkok 10260 Tel. 081-454-2804, 0-2399-0469

The Result of Calibration

7 February, 2024 Certification No. 07624
Page : 5 of 6

Standard Humidity % R.H.	Relative Humidity Sensor Reading	
	Reading % R.H.	Correction % R.H.
45.1	47	-1.80
65.6	66	-0.50
95.2	94	1.20



[illegible]



THAI METEOROLOGICAL DEPARTMENT

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The Result of Calibration

7 February, 2024 Certification No. 077124 Page : 2 of 6

Standard Ultrasonic Anemometer	HOOK GAGE NO. 1425		TESTED ANEMOMETER	
	Pressure hPa/mbar	Vacuum hPa/mbar	Velocity m/sec mi/hr	Correction mi/hr
1.00	-	-	0.9	0.10
3.02	-	-	2.7	0.32
5.00	-	-	4.9	0.10
7.00	-	-	7.0	0.00
9.02	-	-	8.9	0.12
11.01	-	-	11.0	0.01
13.01	-	-	13.0	0.01
15.01	-	-	15.0	0.01
17.02	-	-	17.0	0.02
20.02	-	-	20.0	0.02

Wind Aloft Plotting Board.	
US DEPARTMENT OF COMMERCE WEATHER BUREAU	
WIND DIRECTION	TESTED WIND DIRECTION
0	0
90	90
180	180
270	270



THAI METEOROLOGICAL DEPARTMENT

4353 Sukhumvit, Bangna, Bangkok 10260 Tel. 081-454-2804/0-2399-0469

The Result of Calibration

7 February, 2024 Certification No. 077124 Page : 3 of 6

Standard Barometer Pressure	Tested Barometer Pressure	Correction
758.19	759.4	-1.21
758.01	759.2	-1.19
758.84	760.0	-1.16
759.19	760.3	-1.11
759.20	760.6	-1.21
759.25	760.5	-1.25
759.65	760.9	-1.25
759.77	761.0	-1.23
760.20	761.4	-1.20
760.68	761.8	-1.12
761.90	763.1	-1.20
762.08	763.3	-1.22
761.95	763.1	-1.14
761.83	763.0	-1.17
758.69	759.8	-1.11
758.91	760.0	-1.09
759.11	760.2	-1.09
759.67	760.8	-1.13
759.98	761.1	-1.12
760.18	761.2	-1.02

The Result of Calibration

7 February, 2024

Certification No. 077/24

Page : 4 of 6

Standard Temp. °C	Temperature Sensor		Reading °C	Correction °C
	Reading			
45.3	45.3		0.0	0.0
30.2	30.2		0.0	0.0
15.6	15.7		0.1	0.1

The Result of Calibration

7 February, 2024

Certification No. 077/24

Page : 5 of 6

Standard Humidity % R.H.	Relative Humidity Sensor		Reading % R.H.	Correction % R.H.
	Reading			
45.1	46		-0.90	
65.5	67		-1.50	
95.2	97		-1.80	



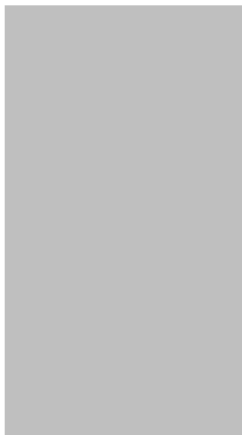
Date of Issue 7 February, 2024

Certification No. 077/24

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ใบรับรอง

หนังสือฉบับนี้ขอรับรองว่า เครื่องวัดหิมะ ยี่ห้อ Davis Instruments แบบ TIPPING
BUCKET Product No. 6152C Mfg. Code. AM140127096 ที่การสอบเทียบกับหน่วยวัดหิมะแบบ
แก้ววง GAUGE DIAMETER 8.0 INCHES, NEGRETTI & ZAMBRA LONDON No. 71082
และสามารถนำไปใช้ได้ถูกต้องตามรายละเอียดของเครื่องมือ (0.01 in./TIP)



THAI METEOROLOGICAL DEPARTMENT
4353 Sukhumvit, Bangna, Bangkok 10260 Tel. 081-454-2804-0-2399-0469
Calibration Certificate

FMDB 97915

Issued by : Calibration & Test Section : Meteorological Instruments Bureau
Date of Issue 31 May, 2024 Certification No. 221/24

Page : 1 of 6

Object : Precision Weather Station

Manufacturer : Davis Instruments

Type : Vantage Pro 2 Model No. : 6152C

Mfg Code : Display AZ170619045 Transmitter BD190415075

Customer : SGS (Thailand) Limited,

100 Nanglinchae Road, Chongnonsi,
Yamawa, Bangkok 10120.

Calibration Condition : Temperature 25.1 °C Barometric Pressure 1008.1 hPa

NATIONAL STANDARD WIND TUNNEL : Wind Anem. Plotting Board

: Micromanometer Theodor Friedrichs FC014 Serial No. 9310719 : HOOK GAGE NO 1425

N.I.S.T. Test Reference Number 731/241460 : Standard Velocity at 20 - 30 m/sec

: Ultrasonic Anemometer Model DA-650-3TV (sensor TR-90AH)

Serial Number 110730029 (sensor 1208295H6)

JAPAN QUALITY ASSURANCE ORGANIZATION : Standard Velocity at 0 - 20 m/sec

STANDARD THERMOMETER : Theodor Friedrich : Dry No. 839094 Wet No. 838994

: Thermochneider No. 9188 : Iesco, Isero 645 Serial No. 02948057





The Result of Calibration



Standard Barometer Pressure	Tested Barometer Pressure	Correction
753.08	754.6	-0.92
753.80	754.8	-1.00
753.92	754.9	-0.98
754.06	755.0	-0.94
754.69	755.6	-0.91
754.76	755.7	-0.94
755.17	756.1	-0.93
755.33	756.3	-0.97
755.45	756.4	-0.96
755.50	756.3	-0.80
754.28	755.2	-0.92
754.78	755.7	-0.92
753.98	755.0	-1.02
754.35	755.4	-1.05
754.69	755.7	-1.01
755.37	756.4	-1.03
755.70	756.7	-1.00
755.75	756.8	-1.05
755.90	756.9	-1.00
756.08	757.1	-1.02

Standard Ultraonic Anemometer m/sec	HOOK GAGE NO. 1425		TESTED ANENOMETER	
	Pressure index HTO	Vacuum index HTO	Velocity m/sec	Correction m/sec
1.00	-	-	0.9	0.10
3.02	-	-	3.0	0.02
5.00	-	-	4.9	0.10
7.00	-	-	7.0	0.00
9.02	-	-	8.9	0.12
11.01	-	-	11.0	0.01
13.01	-	-	13.0	0.01
15.01	-	-	15.0	0.01
17.02	-	-	17.0	0.02
20.02	-	-	19.3	0.02

Wind Aloft Plotting Board. US.DEPARTMENT OF COMMERCE WEATHER BUREAU	
WIND DIRECTION	TESTED WIND DIRECTION
0	0
90	90
180	180



THAI METEOROLOGICAL DEPARTMENT
4353 Sukhumvit, Bangna, Bangkok 10760 Tel. 081-454-2804, 0-2399-0469

The Result of Calibration

Certification No. 221/24
31 May, 2024
Page : 4 of 6

Standard Temp. °C	Temperature Sensor Reading	
	Reading °C	Correction °C
45.2	45.3	-0.1
30.5	30.5	0.0
15.6	15.7	-0.1

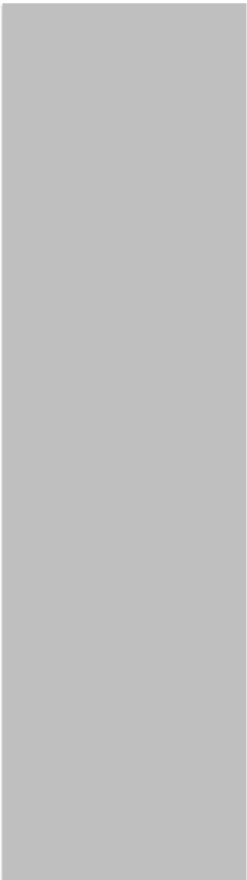


THAI METEOROLOGICAL DEPARTMENT
4353 Sukhumvit, Bangna, Bangkok 10760 Tel. 081-454-2804, 0-2399-0469

The Result of Calibration

Certification No. 221/24
31 May, 2024
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Standard Humidity % R.H.	Relative Humidity Sensor Reading	
	Reading % R.H.	Correction % R.H.
86.32	89	-2.68
67.54	69	-1.46
49.23	47	-0.77



THAI METEOROLOGICAL DEPARTMENT
4353 Sukhumvit, Bangna, Bangkok 10260 Tel. 081-454-2804, 0-2399-0469
Calibration Certificate



Date of Issue 31 May, 2024
Certification No. 221/24
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ใบรับรอง

หนังสือฉบับนี้ขอรับรองว่า เครื่องวัดฝน ยี่ห้อ Davis Instruments แบบ TIPPING
BUCKET Product No. 6152C Mfg. Code. BD190415075 ที่การสอบเทียบกับแก้ววัดฝนแบบ
แก้ววัด 71082 GAUGE DIAMETER 8.0 INCHES, NEGRETTI & ZAMBRA LONDON No. 71082
และสามารถนำไปใช้ได้ มีค่าถูกต้องตามรายละเอียดของเครื่องมือ (0.01 in./TIP)



Issued by : Calibration & Test Section : Meteorological Instruments Bureau
Date of Issue 16 May, 2023
Certification No. 182/23
Page : 1 of 6

Object : Precision Weather Station
Manufacturer : Davis Instruments
Type : Vantage Pro 2 Model No. : 6152C
Mfg Code : Display AZ170619045
Customer : SCS (Thailand) Limited.
100 Nangliachee Road, Chongnonsi,
Yannawa, Bangkok 10120.
Calibration Condition : Temperature 25.1 °C Barometric Pressure 1008.6 hPa



NATIONAL STANDARD WIND TUNNEL : Thermal Anemometer 642 SIN 91563
: HOOK GAGE NO 1425 : Wind Alet Plotting Board
N.I.S.T. Test Reference Number 731241460 : Standard Velocity at 20 - 30 m/sec
: Ultrasonic Anemometer Model DA-650-3TV (sensor TR-90AH)
Serial Number 110730029 (sensor 120629568)
JAPAN QUALITY ASSURANCE ORGANIZATION : Standard Velocity at 0 - 20 m/sec
STANDARD THERMOMETER : Theodor Friedrich : Dry No.8390/94 Wet No. 8389/94





The Result of Calibration

16 May, 2023
Certification No. 182723
Page : 2 of 6

Standard	HOOK GAGE NO. 1425			TESTED ANEMOMETER	
	Pressure	Vacuum	Velocity	Velocity	Correction
Ultrasonic Anemometer	hPa/mbar	hPa/mbar	m/sec	m/sec	m/sec
1.00	-	-	-	0.9	0.10
3.02	-	-	-	2.7	0.32
5.00	-	-	-	4.9	0.10
7.00	-	-	-	6.7	0.30
9.02	-	-	-	8.9	0.12
11.01	-	-	-	10.9	0.11
13.01	-	-	-	13.0	0.01
15.01	-	-	-	14.9	0.11
17.02	-	-	-	17.0	0.02
20.02	-	-	-	19.8	0.22

Wind Airt Plotting Board.	
US DEPARTMENT OF COMMERCE WEATHER BUREAU	
WIND DIRECTION	TESTED WIND DIRECTION
0	0
90	90
180	180



The Result of Calibration

16 May, 2023
Certification No. 182723
Page : 3 of 6

Standard Barometer	Tested Barometer	Correction
Pressure	Pressure	
755.65	755.8	-0.15
755.73	755.9	-0.17
756.63	756.8	-0.17
756.89	757.0	-0.11
757.07	757.1	-0.03
754.82	754.9	-0.08
755.30	755.4	-0.10
755.58	755.7	-0.12
756.66	756.8	-0.14
756.80	756.9	-0.10
757.14	757.3	-0.16
757.96	758.0	-0.04
757.76	757.9	-0.14
757.49	757.6	-0.11
757.19	757.3	-0.11
757.00	757.1	-0.10
756.51	756.6	-0.09
756.25	756.4	-0.14
755.55	756.5	-0.04
757.32	757.4	-0.08



The Result of Calibration

16 May, 2023

Certification No. 182/23

Page : 4 of 6

Standard Temp. °C	Temperature Sensor	
	Reading °C	Correction °C
-45.5	45.6	-0.1
30.2	30.2	0.0
15.6	15.6	0.0



The Result of Calibration

16 May, 2023

Certification No. 182/23

Page : 5 of 6

Standard Humidity % R.H.	Relative Humidity Sensor	
	Reading % R.H.	Correction % R.H.
85.2	87	-1.80
63.5	65	-1.50
45.8	47	-1.20



Date of Issue 16 May, 2023

Certification No. 182/23

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ใบรับรอง

หนังสือยืนยันรับรองว่าเครื่องวัดฝน ตี๋หือ Davis Instruments แบบ TIPPING
BUCKET Product No. 6152 C Mfg. Code. AZ170619045 ทำการสอบเทียบกับแก้ว
ฝนแบบแก้ว GAUGE DIAMETER 8.0 INCHES , NEGRETTI & ZAMBRA
LONDON No 71082 และสามารถนำไปใช้ได้ มีอายุของงานระยะสั้นของ
เครื่องมือ (0.01 in/ TIP)



THAI METEOROLOGICAL DEPARTMENT

4353 Sukhumvit, Bangna, Bangkok, 10260 Tel. 081-454-2804/0-2399-0469

Calibration Certificate

Issued by : Calibration & Test Section : Meteorological Instruments Bureau

Date of Issue : 8 August, 2023

Certification No. 276/23

Page : 1 of 6

Object : Precision Weather Station

Manufacturer : Davis Instruments

Type : Vantage Pro 2 Model No. : 6152C

Mfg Code : Display BD190415075 Transmitter BD190415075

Customer : SGS (Thailand) Limited,
100 Nanglinchae Road, Chongnonsi,
Yamawa, Bangkok 10120.

Calibration Condition : Temperature 25.1 °C Barometric Pressure 1009.1 hPa

NATIONAL STANDARD WIND TUNNEL : Thermal Anemometer 642, S/N 91563

: HOOK GAGE NO 1425 : Wind Anemometer Board

N.I.S.T. Test Reference Number 731241480 : Standard Velocity at 20 - 30 m/sec

: Ultrasonic Anemometer Model DA-550-3TV (Sensor TR-50AH)

Serial Number 110730029 (Sensor 120529506)

JAPAN QUALITY ASSURANCE ORGANIZATION : Standard Velocity at 0 - 20 m/sec

STANDARD THERMOMETER : Theodor Friedrich : Dry No.839034 Wet No. 838894





The Result of Calibration



The Result of Calibration

Certification No. 27623

Page : 2 of 6

8 August, 2023

Standard Ultrasonic Anemometer m/sec	HOOK GAGE NO. 1425		TESTED ANEMOMETER	
	Pressure inches H2O	Vacuum inches H2O	Velocity m/sec	Correction m/sec
1.00	-	-	0.9	0.10
3.02	-	-	3.0	0.02
5.00	-	-	5.0	0.00
7.00	-	-	7.0	0.00
9.02	-	-	9.0	0.02
11.01	-	-	10.9	0.11
13.01	-	-	13.0	0.01
15.01	-	-	15.0	0.01
17.02	-	-	17.0	0.02
20.02	-	-	19.3	-0.08

Wind Alert Plotting Board.	
U.S. DEPARTMENT OF COMMERCE WEATHER BUREAU	
WIND DIRECTION	TESTED WIND DIRECTION
0	0
90	90
180	180
270	

Certification No. 27623

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8 August, 2023

Standard Barometer Pressure	Tested Barometer Pressure	Correction
759.10	761.0	-0.90
760.13	761.1	-0.97
759.80	760.7	-0.90
759.48	760.4	-0.92
759.36	760.3	-0.94
759.20	760.1	-0.90
759.00	760.0	-1.00
758.66	759.5	-0.84
759.46	759.4	-0.92
758.32	759.3	-0.98
758.07	759.0	-0.93
757.91	758.8	-0.89
757.77	758.6	-0.83
757.40	758.3	-0.90
756.88	757.5	-0.82
756.36	757.2	-0.85
755.97	756.9	-0.93
758.07	759.8	-0.83
758.80	759.7	-0.90
758.63	759.5	-0.87



THAI METEOROLOGICAL DEPARTMENT
4353 Sukhumvit, Bangna, Bangkok 10260 Tel. 081-454-2804/0-2399-0469

The Result of Calibration

Certification No. 276/23
8 August, 2023
Page : 4 of 6

Standard Temp. °C	Temperature Sensor	
	Reading °C	Correction °C
45.5	45.7	-0.2
30.2	30.3	-0.1
15.8	15.8	0.0



THAI METEOROLOGICAL DEPARTMENT
4353 Sukhumvit, Bangna, Bangkok 10260 Tel. 081-454-2804/0-2399-0469

The Result of Calibration

Certification No. 276/23
8 August, 2023
Page : 5 of 6

Standard Humidity % R.H.	Relative Humidity Sensor	
	Reading % R.H.	Correction % R.H.
85.52	86	-0.48
65.15	65	0.15
45.68	46	-0.34

INSTRUMENT

THAI METEOROLOGICAL DEPARTMENT



4353 Sukhumvit, Bangna, Bangkok 10260 Tel. 081-454-2804, 0-2399-4469

Calibration Certificate

Date of Issue 8 August, 2023
Certification No. 276/23
Page: 6 of 6

ใบรับรอง

หนังสือฉบับนี้ขอรับรองว่า เครื่องวัดฝน ยี่ห้อ Davis Instruments แบบ TIPPING
BUCKET Product No. 6152C Mfg. Code. BD190415075 ที่การสอบเทียบกับแก้ววัดฝนแบบ
แก้ววง GAUGE DIAMETER 8.0 INCHES, NEGRETTI & ZAMBRA LONDON No. 71082
และสามารถนำไปใช้ได้ มีค่าถูกต้องตามรายละเอียดของเครื่องนี้ (0.01 in/TIP)



Issued by : Calibration & Test Section : Meteorological Instruments Bureau
Date of Issue 7 February, 2024
Certification No. 074/24
Page : 1 of 6

Object : Precision Weather Station
Manufacturer : Davis Instruments
Model No. : 6152C Model No. : 6152C
Mfg Code : Display BD190415030 Transmitter BD190415090
Customer : SGS (Thailand) Limited
100 Nanglinchee Road, Chongnonsi,
Yaniawa, Bangkok 10120.
Calibration Condition : Temperature 25.1 °C Barometric Pressure 1011.9 hPa
NATIONAL STANDARD WIND TUNNEL : Wind Aloit Plotting Board
: Micromanometer Theodor Friedrichs FC014 Serial No. 9310119 : HOOK GAGE NO 1425
N.I.S.T. Test Reference Number 731/241469 : Standard Velocity at 20 - 30 m/sec
: Ultrasonic Anemometer Model DA-650-3TV (sensor TR-80AH)
Serial Number 110730029 (sensor 120629588)
JAPAN QUALITY ASSURANCE ORGANIZATION : Standard Velocity at 0 - 20 m/sec
STANDARD THERMOMETER : Theodor Friedrichs : Dry No. 8590394 Wet No. 8369894



THAI METEOROLOGICAL DEPARTMENT

4353 Sukhumvit, Bangna, Bangkok 10260 Tel. 081-454-2804-0-2399-0469

The Result of Calibration

7 February, 2024 Certification No. 074/24 Page : 2 of 6

Standard	HOOK GAGE NO. 1425		TESTED ANEMOMETER	
	Pressure hPa/mbar	Vacuum hPa/mbar	Velocity m/sec	Correction m/sec
Ultrasonic Anemometer				
m/sec				
1.00	-	-	0.9	0.10
3.02	-	-	3.0	0.02
5.00	-	-	4.9	0.10
7.00	-	-	7.0	0.00
9.02	-	-	9.0	0.02
11.01	-	-	11.0	0.01
13.01	-	-	13.0	0.01
15.01	-	-	15.1	-0.09
17.02	-	-	17.0	0.02
20.02	-	-	20.1	-0.08

Wind Alert Plotting Board.	
US DEPARTMENT OF COMMERCE WEATHER BUREAU	
WIND DIRECTION	TESTED WIND DIRECTION
0	0
90	90



THAI METEOROLOGICAL DEPARTMENT
4353 Sukhumvit, Bangna, Bangkok 10260 Tel. 081-454-2804-0-2399-0469

The Result of Calibration

7 February, 2024 Certification No. 074/24 Page : 3 of 6

Standard Barometer	Tested Barometer	Correction
Pressure	Pressure	
758.19	759.5	-1.31
758.01	759.3	-1.29
758.84	760.2	-1.36
759.19	760.4	-1.21
759.29	760.6	-1.31
759.25	760.7	-1.46
759.65	760.8	-1.15
759.77	760.9	-1.13
760.20	761.4	-1.20
760.88	762.0	-1.32
761.90	763.1	-1.20
762.08	763.3	-1.22
761.96	763.1	-1.14
761.83	763.0	-1.17
758.69	760.0	-1.31
758.51	760.1	-1.19
760.11	760.3	-1.19
760.67	760.9	-1.23



The Result of Calibration

7 February, 2024

Certification No. 07424

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Standard Temp. °C	Temperature Sensor	
	Reading °C	Correction °C
45.3	45.2	0.1
30.2	30.2	0.0
15.9	15.9	-0.1



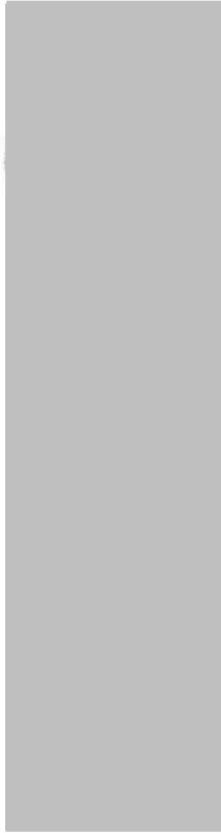
The Result of Calibration

7 February, 2024

Certification No. 07424

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Standard Humidity % R.H.	Relative Humidity Sensor	
	Reading % R.H.	Correction % R.H.
45.1	45	0.10
65.5	67	-1.50
95.2	96	-2.80



TH-2109.20



Date of Issue 7 February, 2024

Certification No. 07424

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ใบรับรอง

หนังสือฉบับนี้ขอรับรองว่า เครื่องวัดฝน ชี้อ Davis Instruments แบบ TIPPING

BUCKET Product No. 6152C มิถุ. Code. BD190415090 ที่การสอบเทียบกับแก้ววัดฝนแบบ

แก้วทรง GAUGE DIAMETER 8.0 INCHES, NEGRETTI & ZAMBRA LONDON No. 71082

และสามารถนำไปใช้ได้ มีค่าถูกต้องตามรายละเอียดของเครื่องมือ (0.01 in./TIP)



THAI METEOROLOGICAL DEPARTMENT
4353 Sukhumvit, Bangna, Bangkok 10260 Tel. (081-454-2804, 0-2399-0469)
Calibration Certificate

Issued by : Calibration & Test Section : Meteorological Instruments Bureau

Date of Issue 7 February, 2024

Certification No. 07324

Page : 1 of 6

Object : Precision Weather Station

Manufacturer : Davis Instruments

Mode No. : 6152C Model No. : 6152C

Mfg Code : Display BD190415091 Transmitter ED190415091

Customer : SGS (Thailand) Limited,

100 Nanglinchee Road, Chongnonsi,

Yanmawa, Bangkok 10120.

Calibration Condition : Temperature 25.1 °C Barometric Pressure 1012.2 hPa

NATIONAL STANDARD WIND TUNNEL : Wind Axiol Picting Board

: Micromanometer Theodor Friedrichs FC014 Serial No. 8910119 : HOOK GAGE NO 1425

N.I.S.T. Test Reference Number 731/241460 : Standard Velocity at 20 - 30 m/sec

: Ultrasonic Anemometer Model DA-650-3TV (Sensor TTR-90AH)

Serial Number 110730029 (Sensor 120629586)

JAPAN QUALITY ASSURANCE ORGANIZATION : Standard Velocity at 0 - 20 m/sec

STANDARD THERMOMETER : Theodor Friedrich : Dry No.8390/94 Wet No. 8389/84



The Result of Calibration



The Result of Calibration

7 February, 2024
Certification No. 073/24

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Standard Ultrasonic Anemometer m/sec	HOOK GAGE NO. 1425			TESTED ANEMOMETER	
	Pressure Hohen 1425	Vacuum Hohen 1425	Velocity m/sec	Velocity m/sec	Correction m/sec
1.00	-	-	-	0.9	0.10
3.02	-	-	-	3.1	-0.08
5.00	-	-	-	4.9	0.10
7.00	-	-	-	7.1	-0.10
9.02	-	-	-	9.0	0.02
11.01	-	-	-	11.1	-0.09
13.01	-	-	-	13.0	0.01
15.01	-	-	-	15.0	0.01
17.02	-	-	-	17.0	0.02
20.02	-	-	-	20.0	0.02

Wind Aloft Plotting Board.		
U.S. DEPARTMENT OF COMMERCE WEATHER BUREAU		
WIND DIRECTION	TESTED WIND DIRECTION	
	0	90
0		
90		
180		
270		

270 11 22 23

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Standard Barometer Pressure	Tested Barometer Pressure	Correction
758.19	761.4	-3.21
758.01	761.2	-3.19
759.84	762.0	-3.16
759.19	762.2	-3.01
759.29	762.3	-3.01
759.25	762.3	-3.05
759.85	762.7	-3.05
759.77	762.8	-3.03
760.20	763.2	-3.00
760.68	763.7	-3.02
761.90	764.8	-2.90
762.08	764.9	-2.82
761.96	765.0	-3.04
761.83	764.9	-3.07
758.69	761.6	-2.91
758.91	761.9	-2.99
759.11	762.1	-2.99
759.87	762.6	-2.93
759.98	763.0	-3.02
760.18	763.0	-2.82

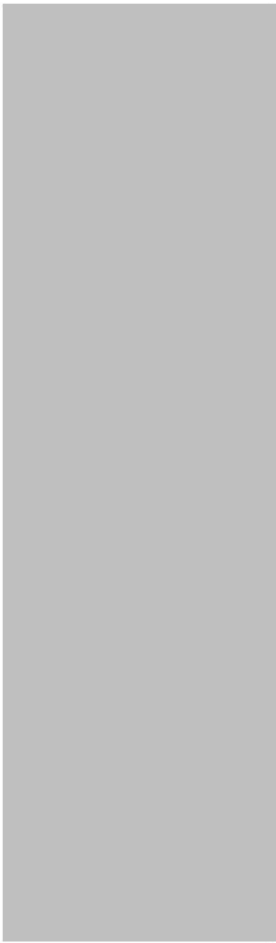
Average -3.01



The Result of Calibration

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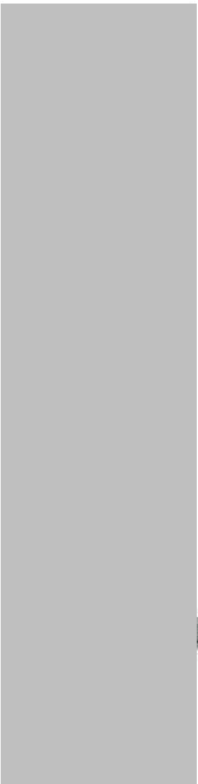
Standard Temp. °C	Temperature Sensor Reading	
	Reading °C	Correction °C
45.3	45.4	-0.1
30.2	30.3	-0.1
15.8	15.8	0.0



The Result of Calibration

7 February, 2024
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Standard Humidity % R.H.	Relative Humidity Sensor Reading	
	Reading % R.H.	Correction % R.H.
45.1	43	2.10
65.5	64	1.50
95.2	97	-1.80





Date of Issue 7 February, 2024

Certification No. 073/24

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ใบรับรอง

หนังสือฉบับนี้รับรองว่า เครื่องวัดฝน ชื่อ Davis Instruments แบบ TIPPING
BUCKET Product No. 6152C Mfg. Code. BD190415091 ที่การสอบเทียบกับแก้วฝนแบบ
แก้วดวง GAUGE DIAMETER 8.0 INCHES, NEGRETTI & ZAMBRA LONDON No. 71082
และสามารถนำไปใช้ได้ มีค่าถูกต้องตามรายละเอียดของเครื่องมือ (0.01 in./TIP)



Certificate No : 24-SI-M-044

Request No : Req-2024-0226

1. Indication at the calibration check frequency						
UUC Setting	Nominal		Before Adjust		After Adjust	
	FAST / A / 20-140	Level (dB)	UUC (dB)	ERR (dB)	UUC (dB)	ERR (dB)
Calibrator Setting						
1000 Hz 94 dB		94.03	95.5	+1.47	94.0	-0.03
Acceptance Limit (± dB)					0.30	

Note : Absolute sensitivity was established by the use of Sound Calibrator Brand Cirrus, Model CR.515, SN. 80411

2. Self-generated noise, Microphone installed	
UUC Setting	Measured UNCERTAINTY (± dB)
FAST / 20-140	
UUC Weighting	
A	18.0
	0.10

3. Self-generated noise, Microphone replaced by the electrical input signal device

UUC Setting	
FAST / 20-140	Measured UNCERTAINTY (± dB)
UUC Weighting	
A	UR 0.10
C	16.5
Z	29.3
	0.10

4. Acoustic signal test of frequency weightings (Without Windscreen)						
UUC Setting	Deviation from various Frequency Weighting Response curve			UNCERTAINTY		Acceptance Limit (± dB)
	Weighting Response curve			(± dB)		
	A (dB)	C (dB)	Z (dB)			
FAST / 20-140 STD Setting						
125 Hz	0.5	0.5	0.6	0.60		1.0
1000 Hz	0.0	0.0	0.0	0.60		0.7
4000 Hz	-0.2	-0.3	-0.2	0.60		1.0
8000 Hz	-1.3	-1.3	-1.3	0.70		+1.5-2.5

Certificate of Calibration

Certificate No : 24-SLM-044

Request No : Req-2024-0226

Customer	
Name	: SGS (Thailand) Limited
Address	: 100 Nanglinchee Road, Chongnonsi, Yanmawa Bangkok 10120
Unit Under Calibration Details	
Measurement Item :	: Sound Level Meter
Manufacturer	: CIRRUS
Model	: CR171B
Serial Number	: G078064
ID	: ENSL 16122
Resolution	: 0.1 dB
Calibration Environment and Details	
Temperature	: 23 °C ± 2 °C
Humidity	: 50 %RH ± 20 %RH
Barometric Pressure	: 1013 hPa ± 10 hPa
Received Date	: 30 January 2024
Calibrated Date	: 13 February 2024
Calibration Procedure	: In-house method CP-SLM-01 based on IEC 61672-3 : 2013 Electroacoustics - Sound level meters - Part 3: Periodic tests
Location of Calibration	: Lab Acoustic
Reference Standard	
Instrument	: SN
Standard Microphone	: Model 40AN
Multifrequency Calibrator	: GRAS 188273
Audio Generator	: Quest EFA00234
	: Svan401
	: 131
	: 9 October 2024
	: WK Electric

Note

The reported uncertainty is based on standard uncertainty multiplied by the Coverage Factor $k = 2$, providing a level of confidence approximately 95 %.

Certificate No : 24-SI-M-044
Request No : Req-2024-0226

7. Long Term Stability

UUC Setting	Measured	UNCERTAINTY	Acceptance Limit
FAST / A / 20-140	UUC	(\pm dB)	(\pm dB)
STD Setting	(dB)		
Initial	114.0		
Final	114.0		
Deviated	0.0	0.10	0.10

8. Level linearity on the reference level range

UUC Setting	Anticipated	Deviation		UNCERTAINTY	Acceptance Limit
		UUC	ERR		
FAST / A / 20-140	REF				
139.00	139	139.0	0.0		0.8
134.00	134	134.0	0.0		0.8
129.00	129	129.0	0.0		0.8
124.00	124	124.0	0.0		0.8
119.00	119	119.0	0.0		0.8
114.00	114	114.0	0.0		0.8
109.00	109	109.0	0.0		0.8
104.00	104	104.0	0.0		0.8
99.00	99	99.0	0.0		0.8
94.00	94	94.0	0.0		0.8
89.00	89	89.0	0.0		0.8
84.00	84	84.0	0.0		0.8
79.00	79	79.0	0.0	0.30	0.8
74.00	74	74.0	0.0		0.8
69.00	69	69.0	0.0		0.8
64.00	64	64.0	0.0		0.8
59.00	59	59.0	0.0		0.8
54.00	54	54.0	0.0		0.8
49.00	49	49.0	0.0		0.8
44.00	44	44.0	0.0		0.8
39.00	39	39.0	0.0		0.8
34.00	34	34.0	0.0		0.8
29.00	29	29.2	0.2		0.8
24.00	24	24.2	0.2		0.8
20.00	20	20.1	0.1		0.8

The results related only to the item calibrated. The certificate shall not be reproduced except in full, without written approval of the Innovative Instrument Co., Ltd.
FM-708-SLM-01 Rev 02 Issue date 7/11/23

Certificate No : 24-SLM-044
Request No : Req-2024-0226

5. Electrical signal test of frequency weightings, Weighting network response with relative to 1 kHz

UUC Setting	Deviation from various Frequency	Weighting Response curve		UNCERTAINTY	Acceptance Limit
		A (dB)	C (dB)		
FAST / 20-140				(\pm dB)	(\pm dB)
STD Setting					
63 Hz	0.3	0.0	0.0		1.0
125 Hz	0.2	0.0	0.0		1.0
250 Hz	0.2	0.0	0.0		1.0
500 Hz	0.1	0.0	0.0		1.0
1000 Hz	0.0	0.0	0.0	0.20	0.7
2000 Hz	-0.2	0.0	0.0		1.0
4000 Hz	-0.4	-0.2	-0.1		1.0
8000 Hz	-0.5	-0.4	-0.1		+1.5, -2.5
16000 Hz	0.1	0.3	-0.3		+2.5, -16.0

6. Frequency and time weightings at 1kHz

UUC Setting	STD	REF	Measured		UNCERTAINTY	Acceptance Limit
			UUC	ERR		
FAST / 20-140					(\pm dB)	(\pm dB)
UUC Weighting						
A	114.00	114.0	114.0	0.0	0.20	0.20
C	114.00	114.0	114.0	0.0	0.20	0.20
Z	114.00	114.0	114.0	0.0	0.20	0.20
UUC Setting	STD	REF	Measured		UNCERTAINTY	Acceptance Limit
20-140 / A			UUC	ERR	(\pm dB)	(\pm dB)
UUC Time Response						
Fast	114.00	114.0	114.0	0.0	0.10	0.10
Slow	114.00	114.0	114.0	0.0	0.20	0.10
Leq	114.00	114.0	114.0	0.0	0.10	0.10

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FM-708-SLM-01 Rev 02 Issue date 7/11/23

Certificate No : 24-SLM-044
Request No : Req-2024-0226

9. Level linearity including the level range control

UUC Setting	STD	Measured		UNCERTAINTY	Acceptance Limit
		UUC	ERR		
FAST / A	REF	(dB)	(dB)	(± dB)	(± dB)
UUC Range	25.10	25.3	0.2	0.30	0.8
	114	114.0	0.0		
20-140					0.8

10. Tone burst response

UUC Setting	STD	Anticipated	Measured		UNCERTAINTY	Acceptance Limit
			UUC	ERR		
A / 20-140	Tonburst	Ref	(dB)	(dB)	(± dB)	(± dB)
UUC Time Response	200	136.0	136.0	0.0	0.5	+1.0, -1.5
	2	119.0	118.9	-0.1		
	0.25	110.0	109.9	-0.1		
Fast	200	129.6	129.6	0.0	0.5	+1.0, -3.0
	2	110.0	110.0	0.0		
	200	130.0	130.0	0.0		
Slow	2	110.0	110.0	0.0	0.5	+1.0, -1.5
	0.25	101.0	100.9	-0.1		
SEL						+1.0, -3.0

11. Peak C Sound level

UUC Setting	Anticipated	Measured		UNCERTAINTY	Acceptance Limit
		UUC	ERR		
FAST / C / 20-140	REF	(dB)	(dB)	(± dB)	(± dB)
STD Setting	135.4	135.5	+0.10	0.30	2.0
	134.4	134.2	-0.20		
Complete cycle					1.0
Positive half cycle					
Negative half cycle					

The results related only to the item calibrated. The certificate shall not be reproduced except in full, without written approval of the Innovative Instrument Co., Ltd.
FM-708-SLM-01 Rev 02 Issue date 7/11/23

Certificate No : 24-SLM-044
Request No : Req-2024-0226

12. Overload indication

UUC Setting	Measured	UNCERTAINTY	Acceptance Limit
FAST / A / 20-140	UUC	(± dB)	(± dB)
STD Setting	145.3		
	145.3		
Positive one-half cycle			
Negative one-half cycle			
Deviated	0.0	0.20	1.5

13. High Level Stability

UUC Setting	Measured	UNCERTAINTY	Acceptance Limit
FAST / A / 20-140	UUC	(± dB)	(± dB)
STD Setting	139.0		
	139.0		
Initial			
Final			
Deviated	0.0	0.10	0.10

Note :

Function	Maximum-permitted Uncertainty of measurement
1. Indication at the calibration check frequency	Not applicable
2. Self-generated noise, Microphone installed	Not applicable
3. Self-generated noise, Microphone replaced by the electrical input signal device	Not applicable
4. Acoustic signal test of frequency weightings at 10 Hz to 4 kHz	0.60 dB
4. Acoustic signal test of frequency weightings at >4 kHz to 10 kHz	0.70 dB
5. Electrical signal test of frequency weightings, Weighting network response with relative to 1 kHz	0.20 dB
6. Frequency and time weightings at 1kHz	0.20 dB
7. Long Term Stability	0.10 dB
8. Level linearity on the reference level range	0.30 dB
9. Level linearity including the level range control	0.30 dB
10. Tone burst response	0.30 dB
11. Peak C Sound level	0.35 dB
12. Overload indication	0.25 dB
13. High Level Stability	0.10 dB

- Acceptance limit and Maximum-permitted Uncertainty was IEC 61672-1:2013

End of Certificate

The results related only to the item calibrated. The certificate shall not be reproduced except in full, without written approval of the Innovative Instrument Co., Ltd.

FM-708-SLM-01 Rev 02 Issue date 7/11/23

Certificate of Calibration

Customer	
Name	: SGS (Thailand) Limited.
Address	: 100 Nantolnhee Road, Chongnonsi, Yamaa Bangkok 10120
	Certificate No : 24-SLM-116
	Request No : Req-2024-6605

Unit Under Calibration Details

Measurement Item :	Sound Level Meter
Manufacturer	CIRRUS
Model	CR:171B
Serial Number	GG78141
ID	ENSL16125
Resolution	0.1 dB
	Instrument Status : Used
	Microphone S/N : 206565A
	Preamplifier Model : MK170
	Preamplifier S/N : 0805
	Microphone Model : MK224
	Microphone Class : 1

Calibration Environment and Details

Temperature	: 23 °C ± 2 °C
Humidity	: 50 %RH ± 20 %RH
Barometric Pressure	: 1013 hPa ± 10 hPa
Received Date	: 12 March 2024
Calibrated Date	: 21 March 2024
Calibration Procedure	: In-house method CP-SLM-01 based on IEC 61672-3, 2013 Electroacoustics - Sound level meters - Part 3: Periodic tests
Location of Calibration	: Lab Acoustic

Reference Standard

	Instrument	Brand	Model	SN	Due calibration	Traceability
1	Standard Microphone	GRAS	40AN	188273	21 August 2024	GRAS
	Multifrequency Calibrator	Quest	Quest-cal	EFA000224	26 July 2024	TSI
	Audio Generator	SvanteK	Svens01	131	9 October 2024	WK Electric

Note
The reported uncertainty is based on standard uncertainty multiplied by the Coverage Factor $k = 2$, providing a level of confidence approximately 95%.

The results related only to the item calibrated. The certificate shall not be reproduced except in full, without written approval of the manufacturing instrument Co., Ltd.

1. Indication at the calibration check frequency

	UUC Setting		Nominal Level (dB)	Before Adjust		After Adjust		UNCERTAINTY (\pm dB)	Acceptance Limit (\pm dB)
	FAST / A, 20-140	Calibrator Setting		UUC (dB)	ERR (dB)	UUC (dB)	ERR (dB)		
1000 Hz 94 dB			93.80	91.9	+0.10	93.8	0.00	0.20	0.30

Note: Absolute sensitivity was established by the use of Sound Calibrator SV 35A, SN. 58079

2. Self-generated noise. Microphone installed

UUC Setting	Measured (dB)	UNCERTAINTY (\pm dB)
FAST / 20-140		
UUC Weighting		
A	16.9	0.10

3. Self-generated noise. Microphone replaced by the electrical input signal device

UUC Setting	Measured	UNCERTAINTY
PAST/ 20-40		
UUC Weighting	(dB)	(\pm dB)
A	UR	0.10
C	19.6	0.10
Z	37.4	0.10

4. Acoustic signal test of frequency weightings

UUC Setting	Deviation from various Frequency				UNCERTAINTY	Acceptance Limit (\pm dB)
	Weighting Response curve					
	A	C	Z	(dB)		
FAST 20-140						
STD Setting						
125 Hz	0.5	0.2	0.2	0.60		1.0
1000 Hz	0.0	0.0	0.0	0.60		0.7
4000 Hz	-0.9	-0.7	-0.5	0.60		1.0
8000 Hz	-0.1	0.1	0.3	0.70		+1.5 -2.5

Certificate No : 24-SLM-116
Request No : Req-2024-0605

7. Long Term Stability

UUC Setting	Measured	UNCERTAINTY (\pm dB)	Acceptance Limit (\pm dB)
FAST / A / 20-140	UUC (dB)		
STD Setting			
Initial	114.0		
Final	114.0		
Deviated	0.0	0.10	0.10

8. Level linearity on the reference level range

UUC Setting	Anticipated	Deviation	Acceptance Limit
FAST / A / 20-140	REF	UUC ERR	UNCERTAINTY
139.00	139	139.0 0.0	0.8
134.00	134	134.0 0.0	0.8
129.00	129	129.0 0.0	0.8
124.00	124	124.0 0.0	0.8
119.00	119	119.0 0.0	0.8
114.00	114	114.0 0.0	0.8
109.00	109	109.0 0.0	0.8
104.00	104	104.0 0.0	0.8
99.00	99	99.0 0.0	0.8
94.00	94	94.1 0.1	0.8
89.00	89	89.0 0.0	0.8
84.00	84	84.0 0.0	0.8
79.00	79	79.0 0.0	0.8
74.00	74	74.1 0.1	0.8
69.00	69	69.1 0.1	0.8
64.00	64	64.1 0.1	0.8
59.00	59	59.1 0.1	0.8
54.00	54	54.1 0.1	0.8
49.00	49	49.1 0.1	0.8
44.00	44	44.1 0.1	0.8
39.00	39	39.1 0.1	0.8
34.00	34	34.1 0.1	0.8
29.00	29	28.9 -0.1	0.8
24.00	24	23.7 -0.3	0.8
20.00	20	19.5 -0.5	0.8

The results related only to the item calibrated. The certificate shall not be reproduced except in full, without written approval of the Innovative Instrument Co., Ltd.
FM-708-SLM-01 Rev 02 Issue date 7/11/23

Certificate No : 24-SLM-116
Request No : Req-2024-0605

5. Electrical signal test of frequency weightings. Weighting network response with relative to 1 kHz

UUC Setting	Deviation from various Frequency	UNCERTAINTY	Acceptance Limit
FAST / 20-140	Weighting Response curve	(\pm dB)	(\pm dB)
STD Setting	A (dB) C (dB) Z (dB)		
63 Hz	0.6 0.0 0.0		1.0
125 Hz	0.3 0.0 0.0		1.0
250 Hz	0.2 0.0 0.0		1.0
500 Hz	0.1 0.0 0.0		1.0
1000 Hz	0.0 0.0 0.0	0.20	0.7
2000 Hz	-0.2 0.0 0.0		1.0
4000 Hz	-0.4 -0.2 0.0		1.0
8000 Hz	-0.5 -0.4 -0.1		+1.5, -2.5
16000 Hz	0.2 0.3 -0.2		+2.5, -16.0

6. Frequency and time weightings at 1kHz

UUC Setting	STD	Measured	UNCERTAINTY	Acceptance Limit
FAST / 20-140	REF	UUC ERR	(\pm dB)	(\pm dB)
UUC Weighting	(dB)	(dB)		
A	114.00	114.0 0.0		0.20
C	114.00	114.0 0.0	0.20	0.20
Z	114.00	114.0 0.0		0.20
UUC Setting	STD	Measured	UNCERTAINTY	Acceptance Limit
20-140 / A	REF	UUC ERR	(\pm dB)	(\pm dB)
UUC Time Response	(dB)	(dB)		
Fast	114.00	114.0 0.0		0.10
Slow	114.00	114.0 0.0	0.20	0.10
Leq	114.00	114.0 0.0		0.10

The results related only to the item calibrated. The certificate shall not be reproduced except in full, without written approval of the Innovative Instrument Co., Ltd.
FM-708-SLM-01 Rev 02 Issue date 7/11/23

Certificate No : 24-SLM-116
Request No : Req-2024-0605

12. Overload indication

UUC Setting	Measured	UNCERTAINTY	Acceptance Limit
FAST / A / 20-140	UUC	(± dB)	(± dB)
STD Setting	(dB)		
Positive one-half cycle	145.8		
Negative one-half cycle	145.8		
Deviated	0.0	0.20	1.5

13. High Level Stability

UUC Setting	Measured	UNCERTAINTY	Acceptance Limit
FAST / A / 20-140	UUC	(± dB)	(± dB)
STD Setting	(dB)		
Initial	139.0		
Final	139.0		
Deviated	0.0	0.10	0.10

Note :

Function	Maximum-permitted Uncertainty of measurement
1. Indication at the calibration check frequency	Not applicable
2. Self-generated noise, Microphone installed	Not applicable
3. Self-generated noise, Microphone replaced by the electrical input signal device	Not applicable
4. Acoustic signal test of frequency weightings at 10 Hz to 4 kHz	0.60 dB
4. Acoustic signal test of frequency weightings at >4 kHz to 10 kHz	0.70 dB
5. Electrical signal test of frequency weightings. Weighting network response with relative to 1 kHz	0.20 dB
6. Frequency and time weightings at 1kHz	0.20 dB
7. Long Term Stability	0.10 dB
8. Level linearity on the reference level range	0.30 dB
9. Level linearity including the level range control	0.30 dB
10. Tone burst response	0.30 dB
11. Peak C Sound level	0.35 dB
12. Overload indication	0.25 dB
13. High Level Stability	0.10 dB

- Acceptance limit and Maximum-permitted Uncertainty was IEC 61672-1:2013

End of Certificate

The results related only to the item calibrated. The certificate shall not be reproduced except in full, without written approval of the Innovative Instrument Co., Ltd
FM-708-SLM-01 Rev.02 Issue date:7/1/23

Certificate No : 24-SLM-116
Request No : Req-2024-0605

9. Level linearity including the level range control

UUC Setting	STD	Measured	UNCERTAINTY	Acceptance Limit
FAST / A	REF	UUC	(± dB)	(± dB)
UUC Range	(dB)	(dB)		
20-140	25.80	25.9	0.1	0.8
	114	114.0	0.0	0.8

10. Tone burst response

UUC Setting	STD	Anticipated	Measured	UNCERTAINTY	Acceptance Limit
A / 20-140	Tonburst	Ref	UUC	(± dB)	(± dB)
UUC Time Response	(ms)	(dB)	ERR		
Fast	200	136.0	136.0	0.0	0.5
	2	119.0	118.8	-0.2	+1.0, -1.5
	0.25	110.0	109.8	-0.2	+1.0, -3.0
Slow	200	129.6	129.5	-0.1	0.5
	2	110.0	109.9	-0.1	+1.0, -3.0
	200	130.0	130.0	0.0	0.5
SEL	2	110.0	109.9	-0.1	+1.0, -1.5
	0.25	101.0	100.9	-0.1	+1.0, -3.0

11. Peak C Sound level

UUC Setting	Anticipated	Measured	UNCERTAINTY	Acceptance Limit
FAST / C / 20-140	REF	UUC	(± dB)	(± dB)
STD Setting	(dB)	(dB)		
Complete cycle	135.4	135.5	+0.10	2.0
Positive half cycle	134.4	134.2	-0.20	1.0
Negative half cycle	134.4	134.2	-0.20	1.0

The results related only to the item calibrated. The certificate shall not be reproduced except in full, without written approval of the Innovative Instrument Co., Ltd
FM-708-SLM-01 Rev.02 Issue date:7/1/23

Certificate No : 24-SLM-132
Request No : Req-2024-0606

1. Indication at the calibration check frequency

UUC Setting	Before Adjust		After Adjust		UNCERTAINTY	Acceptance Limit
	Nominal Level	UUC (dB)	ERR (dB)	UUC (dB)		
FAST / A, 20-140						
Calibrator Setting						
1000 Hz 94 dB	94.01	93.2	-0.81	94.0	0.20	0.30

Note : Absolute sensitivity was established by the use of Sound Calibrator CIRRUS, Model CR 515, SN: 80400

2. Self-generated noise, Microphone installed

UUC Setting	Measured	UNCERTAINTY
FAST / 20-140		
UUC Weighting		
A	17.9	0.10

3. Self-generated noise, Microphone replaced by the electrical input signal device

UUC Setting	Measured	UNCERTAINTY
FAST / 20-140		
UUC Weighting		
A	UR	0.10
C	19.8	0.10
Z	31.0	0.10

4. Acoustic signal test of frequency weightings (Without Windscreen)

UUC Setting	Deviation from various Frequency Weighting Response curve				UNCERTAINTY	Acceptance Limit
	A	C	Z			
FAST / 20-140						
STD Setting	(dB)	(dB)	(dB)		(± dB)	(± dB)
125 Hz	0.0	0.1	0.1	0.69	1.0	1.0
1000 Hz	0.0	0.0	0.0	0.69	0.7	0.7
4000 Hz	-0.6	-0.3	-0.1	0.69	1.0	1.0
8000 Hz	-0.6	-0.3	0.0	0.70	+1.5-2.5	

The results related only to the item calibrated. The certificate shall not be reproduced except in full, without written approval of the Innovative Instrument Co., Ltd.
FIS-106-SLM-01 Rev 02 Issue date: 7/11/23

Certificate of Calibration

Customer : SGS (Thailand) Limited,
Name : 100 Nongluechee Road, Chongnonsi, Yamaewa Bangkok 10120
Address : 100 Nongluechee Road, Chongnonsi, Yamaewa Bangkok 10120

Certificate No : 24-SLM-132
Request No : Req-2024-0606

Unit Under Calibration Details

Measurement item : Sound Level Meter
Manufacturer : CIRRUS
Model : CR171B
Serial Number : 0078138
ID : ENSL 16127
Resolution : 0.1 dB
Calibration Environment and Details
Temperature : 23 °C ± 2 °C
Humidity : 50 %RH ± 20 %RH
Barometric Pressure : 1013 hPa ± 10 hPa
Received Date : 12 March 2024
Calibrated Date : 28 March 2024
Calibration Procedure : In-house method CIP-SLM-01 based on IEC 61672-3 : 2013 Electroacoustics - Sound level meters - Part 3: Periodic tests
Location of Calibration : Lab Acoustic

Reference Standard

Instrument	Brand	Model	SN	Due calibration	Traceability
Standard Microphone	GRAS	40AN	188273	21 August 2024	GRAS
Multi-frequency Calibrator	Quest	Quest-cal	IFA000234	26 July 2024	TSI
Audio Generator	Sennheiser	Senn401	131	9 October 2024	W.K. Electric

Note
The reported uncertainty is based on standard uncertainty multiplied by the Coverage Factor $k = 2$, providing a level of confidence approximately 95 %.

The results related only to the item calibrated. The certificate shall not be reproduced except in full, without written approval of the Innovative Instrument Co., Ltd.
FIS-106-SLM-01 Rev 02 Issue date: 7/11/23

Certificate No : 24-SLM-132
Request No : Req-2024-0606

9. Level linearity including the level range control

UUC Setting	STD	Measured		UNCERTAINTY	Acceptance Limit
		UUC	ERR		
FAST / A	REF	(dB)	(dB)	(± dB)	(± dB)
UUC Range	24.40	24.7	0.3	0.30	0.8
	114	114.0	0.0		
20-140					0.8

10. Tone burst response

UUC Setting	STD	Toneburst	Anticipated		Measured		UNCERTAINTY	Acceptance Limit
			Ref	(dB)	UUC	ERR		
A / 20-140								
UUC Time Response	200	2	136.0	136.0	136.0	0.0	0.20	0.5
Fast	2	2	119.0	118.8	118.8	-0.2	0.5	+1.0, -1.5
Slow	300	0.25	110.0	109.8	109.8	-0.2	0.5	+1.0, -3.0
SEL	2	2	110.0	109.9	109.9	-0.1	0.5	+1.0, -3.0
	300	2	130.0	130.0	130.0	0.0	0.5	+1.0, -1.5
	2	2	110.0	110.0	110.0	0.0	0.5	+1.0, -1.5
	0.25	2	101.0	100.9	100.9	-0.1	0.5	+1.0, -3.0

11. Peak C Sound level

UUC Setting	STD	Anticipated	Measured		UNCERTAINTY	Acceptance Limit
			UUC	ERR		
FAST / C / 20-140		REF	(dB)	(dB)	(± dB)	(± dB)
STD Setting	135.4	135.5	135.5	+0.10	0.20	2.0
Complete cycle	134.4	134.2	134.2	-0.20	1.0	1.0
Positive half cycle	134.4	134.2	134.2	-0.20	1.0	1.0
Negative half cycle	134.4	134.2	134.2	-0.20	1.0	1.0

The results related only to the item calibrated. The certificate shall not be reproduced except in full, without written approval of the Innovative Instrument Co., Ltd.
FM-708-SLM-01 Rev.02 Issue date: 7/11/23

Certificate No : 24-SLM-132
Request No : Req-2024-0606

12. Overload indication

UUC Setting	Measured	UNCERTAINTY	Acceptance Limit
FAST / A / 20-140	UUC	(± dB)	(± dB)
STD Setting	(dB)	149.1	149.5
Positive one-half cycle	149.1	0.20	1.5
Negative one-half cycle	149.5	0.20	1.5
Deviated	-0.4		

13. High Level Stability

UUC Setting	Measured	UNCERTAINTY	Acceptance Limit
FAST / A / 20-140	UUC	(± dB)	(± dB)
STD Setting	(dB)	139.0	139.0
Initial	139.0	0.10	0.10
Final	139.0	0.10	0.10
Deviated	0.0		

Note :

Function	Maximum-permitted Uncertainty of measurement
1. Indication at the calibration check frequency	Not applicable
2. Self-generated noise, Microphone installed	Not applicable
3. Self-generated noise, Microphone replaced by the electrical input signal device	Not applicable
4. Acoustic signal test of frequency weightings at 10 Hz to 4 kHz	0.60 dB
4. Acoustic signal test of frequency weightings at >4 kHz to 10 kHz	0.70 dB
5. Electrical signal test of frequency weightings, Weighting network response with relative to 1 kHz	0.20 dB
6. Frequency and time weightings at 1kHz	0.20 dB
7. Long Term Stability	0.10 dB
8. Level linearity on the reference level range	0.30 dB
9. Level linearity including the level range control	0.30 dB
10. Tone burst response	0.30 dB
11. Peak C Sound level	0.35 dB
12. Overload indication	0.25 dB
13. High Level Stability	0.10 dB

- Acceptance limit and Maximum-permitted Uncertainty was IEC 61672:12013

End of Certificate

The results related only to the item calibrated. The certificate shall not be reproduced except in full, without written approval of the Innovative Instrument Co., Ltd.

FM-708-SLM-01 Rev.02 Issue date: 7/11/23

ENSL 16135

Certificate of Calibration

Customer

NameSGS (Thailand) Limited

Address100 Nanglinchae Road, Chongnonsi, Yamsua Bangkok 10120

Certificate No : 23-SLM-311

Request No : Req-2023-1904

Unit Under Calibration Details

Measurement item : Sound Level Meter

Manufacturer : Cirrus

Model : CR161B

Serial Number : C078436

ID : ENSL 16135

Resolution : 0.1 dB

Calibration Environment and Details

Temperature : 23 °C ± 2 °C

Humidity : 50 %RH ± 20 %RH

Barometric Pressure : 1013 hPa ± 10 hPa

Received Date : 4 September 2023

Calibrated Date : 19 September 2023

Calibration Procedure : In-house method (P-SLM-01) based on IEC 61672-3 : 2013 Electroacoustics - Sound level meters - Part 3: Periodic tests

Location of Calibration : Lab Acoustic

Microphone Class : 1

Microphone Model : MK224

Microphone SN : 209940D

Preamplifier Model : MK170

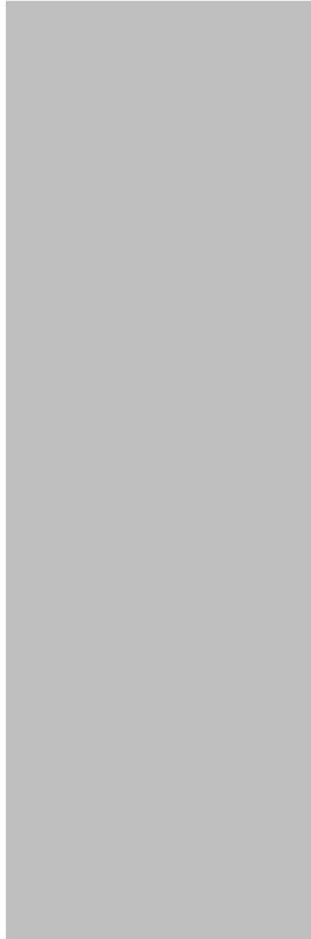
Preamplifier SN : 0926

Intrument Status : Used

Instrument	Brand	Model	SN	Due calibration	Traceability
Standard Microphone	GRAS	40AN	188273	6 October 2023	GRAS
Multifrequency Calibrator	Quest	Quest-cal	EFA000234	25 July 2024	TSI
Audio Generator	Stamok	Swan401	131	12 October 2023	WK Electric

Note

The reported uncertainty is based on standard uncertainty multiplied by the Coverage Factor $k = 2$, providing a level of confidence approximately 95 %.



1. Indication at the calibration check frequency

UUC Setting	Nominal Level (dB)	Before Adjust		After Adjust		UNCERTAINTY (± dB)	Acceptance Limit (± dB)
		UUC (dB)	ERR (dB)	UUC (dB)	ERR (dB)		
FAST / A / 20-140							
Calibrator Setting							
1000 Hz 94 dB	93.95	92.8	-1.15	94.0	+0.05	0.2	0.3

Note : Absolute sensitivity was established by the use of Sound Calibrator Brand Cirrus, Model CR-515, SN: 88350

2. Self-generated noise, Microphone installed

UUC Setting	Measured	UNCERTAINTY (± dB)
FAST / 20-140		
UUC Weighting		
A	16.7	0.1

3. Self-generated noise, Microphone replaced by the electrical input signal device

UUC Setting	Measured	UNCERTAINTY (± dB)
FAST / 20-140		
UUC Weighting		
A	UR	0.1
C	16.0	0.1
Z	20.6	0.1

4. Acoustic signal test of frequency weightings (Without Windscreen)

UUC Setting	Deviation from various Frequency Weighting Response curve					UNCERTAINTY (± dB)	Acceptance Limit (± dB)
	A	C	Z				
FAST / 20-140							
STD Setting							
125 Hz	0.4	0.2	0.1		0.6	1.0	1.0
1000 Hz	0.0	0.0	0.0		0.6	0.7	0.7
4000 Hz	-0.8	-0.6	-0.4		0.6	1.0	1.0
8000 Hz	-0.8	-0.6	-0.4		0.7	+1.5 -2.5	+1.5 -2.5

Certificate No : 23-SLM-311
Request No : Req-2023-1904

5. Electrical signal test of frequency weightings, Weighting network response with relative to 1 kHz

UUC Setting	Deviation from various Frequency				Acceptance Limit (± dB)
	A (dB)	C (dB)	Z (dB)	U (dB)	
FAST / 20-140					
STD Setting					
63 Hz	0.5	0.1	0.1		1.0
125 Hz	0.3	0.1	0.1		1.0
250 Hz	0.2	0.0	0.0		1.0
500 Hz	0.1	0.1	0.0		1.0
1000 Hz	0.0	0.0	0.0		0.7
2000 Hz	-0.1	0.0	0.0		1.0
4000 Hz	-0.3	-0.2	0.0		1.0
8000 Hz	-0.5	-0.3	-0.1		+1.5, -2.5
16000 Hz	0.2	0.3	-0.2		+2.5, -16.0

6. Frequency and time weightings at 1kHz

UUC Setting	STD REF (dB)	Measured		Acceptance Limit (± dB)
		UUC (dB)	ERR (dB)	
FAST / 20-140				
UUC Weighting				
A	114.00	114.0	0.0	0.2
C	114.00	114.0	0.0	0.2
Z	114.00	114.0	0.0	0.2
UUC Setting	STD REF (dB)	Measured		Acceptance Limit (± dB)
20-140 / A		UUC (dB)	ERR (dB)	
UUC Time Response				
Fast	114.00	114.0	0.0	0.1
Slow	114.00	114.0	0.0	0.1
Leq	114.00	114.0	0.0	0.1

7. Long Term Stability

UUC Setting	Measured	UUC	Acceptance Limit (± dB)
FAST / A / 20-140			
STD Setting			
Initial		114.0	
Final		114.0	
Deviated		0.0	0.1

8. Level linearity on the reference level range

UUC Setting	Anticipated REF (dB)	Deviation		Acceptance Limit (± dB)
		UUC (dB)	ERR (dB)	
FAST / A / 20-140				
STD dB				
139.00	139	139.0	0.0	0.8
134.00	134	134.0	0.0	0.8
129.00	129	129.0	0.0	0.8
124.00	124	124.0	0.0	0.8
119.00	119	119.0	0.0	0.8
114.00	114	114.0	0.0	0.8
109.00	109	109.0	0.0	0.8
104.00	104	104.0	0.0	0.8
99.00	99	99.0	0.0	0.8
94.00	94	94.0	0.0	0.8
89.00	89	89.2	0.2	0.8
84.00	84	84.0	0.0	0.8
79.00	79	79.0	0.0	0.8
74.00	74	74.0	0.0	0.8
69.00	69	69.0	0.0	0.8
64.00	64	64.0	0.0	0.8
59.00	59	59.1	0.1	0.8
54.00	54	54.0	0.0	0.8
49.00	49	49.1	0.1	0.8
44.00	44	44.0	0.0	0.8
39.00	39	39.1	0.1	0.8
34.00	34	34.1	0.1	0.8
29.00	29	29.0	0.0	0.8
24.00	24	24.1	0.1	0.8
20.00	20	19.7	-0.3	0.8

Certificate No : 23-SLM-311
 Request No : Req-2023-1904

12. Overload indication

UUC Setting	Measured	UNCERTAINTY	Acceptance Limit
FAST / A / 20-140	UUC (dB)	(± dB)	(± dB)
STD Setting	148.5		
Positive one-half cycle	148.2		
Negative one-half cycle	0.3	0.2	1.5
Deviated			

13. High Level Stability

UUC Setting	Measured	UNCERTAINTY	Acceptance Limit
FAST / A / 20-140	UUC (dB)	(± dB)	(± dB)
STD Setting	139.0		
Initial	139.0		
Final	0.0	0.1	0.1
Deviated			

End of Certificate

Certificate No : 23-SLM-311
 Request No : Req-2023-1904

9. Level linearity including the level range control

UUC Setting	STD	Measured	UNCERTAINTY	Acceptance Limit
FAST / A	REF	UUC (dB)	(± dB)	(± dB)
UUC Range	25.5	25.4	-0.1	0.8
20-140	114	114.0	0.0	0.8

10. Tone burst response

UUC Setting	STD	Anticipated	Measured	UNCERTAINTY	Acceptance Limit
A / 20-140	Toneburst	Ref (dB)	UUC (dB)	(± dB)	(± dB)
UUC Time Response	(ms)		ERR (dB)		
Fast	200	136.0	135.8	-0.2	0.5
	2	119.0	118.1	-0.9	+1.0, -1.5
	0.25	110.0	109.4	-0.6	+1.0, -3.0
Slow	200	129.6	129.3	-0.3	0.5
	2	110.0	109.2	-0.8	+1.0, -3.0
	200	130.0	129.7	-0.3	0.5
SEL	2	110.0	109.2	-0.8	+1.0, -1.5
	0.25	101.0	100.5	-0.5	+1.0, -3.0

11. Peak C Sound level

UUC Setting	Anticipated	Measured	UNCERTAINTY	Acceptance Limit
FAST / C / 20-140	REF	UUC (dB)	(± dB)	(± dB)
STD Setting	135.4	136.9	+1.50	2.0
Complete cycle	134.4	135.2	+0.80	1.0
Positive half cycle	134.4	135.2	+0.80	1.0
Negative half cycle	134.4	135.2	+0.80	1.0

CSNOL 10/10/1



Certificate of Calibration

Customer
Name: SGS (Thailand) Limited
Address: 100 Nanglinthee Road, Chongmontri, Yamaawa Bangkok 10120
Certificate No: 23-SLM-310
Request No: Req-2023-1903

Unit Under Calibration Details
Measurement Item: Sound Level Meter
Manufacturer: Cirrus
Model: CR161B
Serial Number: G097969
ID: ENSL18157
Resolution: 0.1 dB
Microphone Class: 1
Microphone Model: MK224
Preamplifier Model: MK170
Preamplifier SN: 0832
Instrument Status: Used

Calibration Environment and Details
Temperature: 23 °C ± 2 °C
Humidity: 50 %RH ± 20 %RH
Barometric Pressure: 1013 hPa ± 10 hPa
Received Date: 4 September 2023
Calibrated Date: 19 September 2023

Calibration Procedure
Location of Calibration: Lab Acoustic
Reference Standard: In-house method C (1-SLM-9) based on IEC 61672-3: 2013 Electroacoustics - Sound level meters - Part 3: Periodic tests

Instrument	Brand	Model	SN	Due calibration	Traceability
Standard Microphone	GRAS	40AN	188273	6 October 2023	GRAS
Multi-frequency Calibrator	Quest	Quest-cal	EF/A000234	25 July 2024	TSI
Audio Generator	Svanick	Svan-401	131	12 October 2023	WK Electric

Note
The reported uncertainty is based on standard uncertainty multiplied by the Coverage Factor $k = 2$, providing a level of confidence approximately 95 %.



1. Indication at the calibration check frequency

UUC Setting	Nominal Level (dB)	Before Adjust UUC (dB)	After Adjust UUC (dB)	Acceptance Limit (± dB)
FAST / A / 20-140				
Calibrator Setting				
1000 Hz 94 dB	93.95	93.6	94.0	0.3

Note: Absolute sensitivity was established by the use of Sound Calibrator Brand Cirrus, Model CR1515, SN: 88350

2. Self-generated noise, Microphone installed

UUC Setting	Measured (dB)	UNCERTAINTY (± dB)
FAST / 20-140		
UUC Weighting		
A	18.6	0.1

3. Self-generated noise, Microphone replaced by the electrical input signal device

UUC Setting	Measured (dB)	UNCERTAINTY (± dB)
FAST / 20-140		
UUC Weighting		
A	UR	0.1
C	18.3	0.1
Z	29.6	0.1

4. Acoustic signal test of frequency weightings (Without Windscreen)

UUC Setting	Deviation from various Frequency Weighting Response curve	UNCERTAINTY (± dB)	Acceptance Limit (± dB)
FAST / 20-140	A C Z		
STD Setting	(dB)	(dB)	(dB)
125 Hz	0.2	0.1	0.6
1000 Hz	0.0	0.0	0.6
4000 Hz	-0.3	0.0	0.6
8000 Hz	-0.1	0.2	0.7

Certificate No : 23-SLM-310
 Request No : Req-2023-1903

7. Long Term Stability

UUC Setting	Measured	UNCERTAINTY	Acceptance Limit
FAST / A / 20-140	UUC (dB)	(± dB)	(± dB)
STD Setting			
Initial	114.0		
Final	114.0		
Deviated	0.0	0.1	0.1

8. Level linearity on the reference level range

UUC Setting	Anticipated	Deviation	UNCERTAINTY	Acceptance Limit
FAST / A / 20-140	REF (dB)	UUC (dB) ERR (dB)	(± dB)	(± dB)
STD dB				
139.00	139	139.0 0.0		0.8
134.00	134	134.0 0.0		0.8
129.00	129	129.0 0.0		0.8
124.00	124	124.0 0.0		0.8
119.00	119	119.0 0.0		0.8
114.00	114	114.0 0.0		0.8
109.00	109	109.0 0.0		0.8
104.00	104	104.0 0.0		0.8
99.00	99	99.0 0.0		0.8
94.00	94	94.0 0.0		0.8
89.00	89	89.0 0.0		0.8
84.00	84	84.0 0.0		0.8
79.00	79	79.0 0.0	0.3	0.8
74.00	74	74.0 0.0		0.8
69.00	69	69.0 0.0		0.8
64.00	64	64.0 0.0		0.8
59.00	59	59.0 0.0		0.8
54.00	54	54.0 0.0		0.8
49.00	49	49.0 0.0		0.8
44.00	44	44.0 0.0		0.8
39.00	39	39.1 0.1		0.8
34.00	34	34.0 0.0		0.8
29.00	29	29.2 0.2		0.8
24.00	24	24.4 0.4		0.8
23.00	23	23.4 0.4		0.8

The results related only to the item calibrated. The certificate shall not be reproduced except in full, without written approval of the Innovative Instrument Co., Ltd
 FM-708-SLM-01 Rev.0 Issue date 01/07/19

Certificate No : 23-SLM-310
 Request No : Req-2023-1903

5. Electrical signal test of frequency weightings, Weighting network response with relative to 1 kHz

UUC Setting	Deviation from various Frequency	UNCERTAINTY	Acceptance Limit
FAST / 20-140	Weighting Response curve	(± dB)	(± dB)
STD Setting	A (dB) C (dB) Z (dB)		
63 Hz	0.2 0.1 0.1		1.0
125 Hz	0.2 0.1 0.0		1.0
250 Hz	0.2 0.0 0.0		1.0
500 Hz	0.1 0.0 0.0		1.0
1000 Hz	0.0 0.0 0.0	0.2	0.7
2000 Hz	-0.2 0.0 0.0		1.0
4000 Hz	-0.4 -0.2 0.0		1.0
8000 Hz	-0.5 -0.4 -0.1		+1.5, -2.5
16000 Hz	0.2 0.3 -0.3		+2.5, -16.0

6. Frequency and time weightings at 1 kHz

UUC Setting	STD	Measured	UNCERTAINTY	Acceptance Limit
FAST / 20-140	REF (dB)	UUC (dB) ERR (dB)	(± dB)	(± dB)
UUC Weighting				
A	114.00	114.0 0.0		0.2
C	114.00	114.0 0.0	0.2	0.2
Z	114.00	114.0 0.0		0.2

UUC Setting	STD	Measured	UNCERTAINTY	Acceptance Limit
20-140 / A	REF (dB)	UUC (dB) ERR (dB)	(± dB)	(± dB)
UUC Time Response				
Fast	114.00	114.0 0.0		0.1
Slow	114.00	114.0 0.0	0.2	0.1
Leq	114.00	114.0 0.0		0.1

The results related only to the item calibrated. The certificate shall not be reproduced except in full, without written approval of the Innovative Instrument Co., Ltd
 FM-708-SLM-01 Rev.0 Issue date 01/07/19

Certificate No : 23-SLM-310
Request No : Req-2023-1903

9. Level linearity including the level range control

UUC Setting	STD	Anticipated		Measured		UNCERTAINTY (\pm dB)	Acceptance Limit (\pm dB)
		REF	UUC	ERR	ERR		
FAST / A							
UUC Range							
		28.6	28.8	0.2			0.8
20-140	114	114.0	0.0		0.3		0.8

10. Tone burst response

UUC Setting	STD	Toneburst (ms)	Anticipated		Measured		UNCERTAINTY (\pm dB)	Acceptance Limit (\pm dB)
			Ref	UUC	ERR	ERR		
A / 20-140								
UUC Time Response								
		200	136.0	136.0	0.0	0.0		0.5
		2	119.0	119.0	0.0	0.0		+1.0, -1.5
		0.25	110.0	109.9	-0.1			+1.0, -3.0
		200	129.6	129.6	0.0	0.0		0.5
		2	110.0	110.0	0.0	0.0		+1.0, -3.0
		200	130.0	130.0	0.0	0.0		0.5
		2	110.0	110.0	0.0	0.0		+1.0, -1.5
		0.25	101.0	101.0	0.0	0.0		+1.0, -3.0

11. Peak C Sound level

UUC Setting	STD	Anticipated REF	Measured		UNCERTAINTY (\pm dB)	Acceptance Limit (\pm dB)
			UUC	ERR		
FAST / C / 20-140						
STD Setting						
		135.4	135.7	+0.30		2.0
Complete cycle		134.4	134.3	-0.10	0.2	1.0
Positive half cycle						
Negative half cycle		134.4	134.3	-0.10		1.0

Certificate No : 23-SLM-310
Request No : Req-2023-1903

12. Overload indication

UUC Setting	Measured UUC (dB)	UNCERTAINTY (\pm dB)	Acceptance Limit (\pm dB)
FAST / A / 20-140			
STD Setting			
	141.6		
Positive one-half cycle			
Negative one-half cycle	141.3		
Deviated	0.3	0.2	1.5

13. High Level Stability

UUC Setting	Measured UUC (dB)	UNCERTAINTY (\pm dB)	Acceptance Limit (\pm dB)
FAST / A / 20-140			
STD Setting			
Initial	139.0		
Final	139.0		
Deviated	0.0	0.1	0.1

End of Certificate

7. Long Term Stability

UUC Setting	Measured		UNCERTAINTY (± dB)	Acceptance Limit (± dB)
	FAST / A / 20-140	UUC (dB)		
STD Setting				
	Initial	114.0		
	Final	114.0		
Deviated		0.0	0.10	0.10

8. Level linearity on the reference level range

UUC Setting	FAST / A / 20-140	Anticipated		Deviation		UNCERTAINTY	Acceptance Limit
		REF	UUC	UUC	ERR		
FAST / A / 20-140	139.00	139	139.0	0.0	0.0	0.30	0.8
	134.00	134	134.0	0.0	0.0		0.8
	129.00	129	129.0	0.0	0.0		0.8
	124.00	124	124.0	0.0	0.0		0.8
FAST / A / 20-140	119.00	119	119.1	0.1	0.1		0.8
	114.00	114	114.0	0.0	0.0		0.8
	109.00	109	109.0	0.0	0.0		0.8
	104.00	104	104.1	0.1	0.1		0.8
FAST / A / 20-140	99.00	99	99.0	0.0	0.0		0.8
	94.00	94	94.1	0.1	0.1		0.8
	89.00	89	89.1	0.1	0.1		0.8
	84.00	84	84.0	0.0	0.0		0.8
FAST / A / 20-140	79.00	79	79.1	0.1	0.1		0.8
	74.00	74	74.1	0.1	0.1		0.8
	69.00	69	69.1	0.1	0.1		0.8
	64.00	64	64.1	0.1	0.1		0.8
FAST / A / 20-140	59.00	59	59.1	0.1	0.1		0.8
	54.00	54	54.1	0.1	0.1		0.8
	49.00	49	49.1	0.1	0.1		0.8
	44.00	44	44.1	0.1	0.1		0.8
FAST / A / 20-140	39.00	39	39.1	0.1	0.1		0.8
	34.00	34	34.1	0.1	0.1		0.8
	29.00	29	29.2	0.2	0.2		0.8
	24.00	24	24.2	0.2	0.2		0.8
20.00		20	20.4	0.4	0.4		0.8

5. Electrical signal test of frequency weightings, Weighting network response with relative to 1 kHz

UUC Setting		Deviation from various Frequency				UNCERTAINTY (± dB)	Acceptance Limit (± dB)
FAST / 20-140		Weighting Response curve					
STD Setting		A (dB)	C (dB)	Z (dB)		0.20	
	63 Hz	0.3	0.0	0.0			1.0
	125 Hz	0.2	0.0	0.0			1.0
	250 Hz	0.2	0.0	0.0			1.0
	500 Hz	0.1	0.0	-0.1			1.0
	1000 Hz	0.0	-0.1	-0.1			0.7
	2000 Hz	-0.2	-0.1	-0.1			1.0
	4000 Hz	-0.4	-0.2	-0.1			1.0
	8000 Hz	-0.5	-0.4	-0.1			+1.5, -2.5
	16000 Hz	0.1	0.3	-0.3			-2.5, -16.0

6. Frequency and time weightings at 1kHz

UUC Setting	FAST / 20-140	UUC Weighting	STD	REF	Measured		UNCERTAINTY (± dB)	Acceptance Limit (± dB)
					UUC (dB)	ERR (dB)		
A	114.00	114.00	114.00	114.0	114.0	0.0	0.20	0.20
					114.0	0.0		0.20
					114.0	0.0		0.20
C	114.00	114.00	114.00	114.0	114.0	0.0	0.20	0.20
					114.0	0.0		0.20
					114.0	0.0		0.20
Z	114.00	114.00	114.00	114.0	114.0	0.0	0.20	0.20
					114.0	0.0		0.20
					114.0	0.0		0.20

Certificate No : 24-SLM-042
Request No : Req-2024-0227

12. Overload indication

UUC Setting	Measured	UNCERTAINTY	Acceptance Limit
FAST / A / 20-140	UUC (dB)	(± dB)	(± dB)
STD Setting			
Positive one-half cycle	148.3		
Negative one-half cycle	148.1		
Deviated	0.2	0.20	1.5

13. High Level Stability

UUC Setting	Measured	UNCERTAINTY	Acceptance Limit
FAST / A / 20-140	UUC (dB)	(± dB)	(± dB)
STD Setting			
Initial	139.0		
Final	139.0		
Deviated	0.0	0.10	0.10

Note :

Function	Maximum-permitted Uncertainty of measurement
1. Indication at the calibration check frequency	Not applicable
2. Self-generated noise, Microphone installed	Not applicable
3. Self-generated noise, Microphone replaced by the electrical input signal device	Not applicable
4. Acoustic signal test of frequency weightings at 10 Hz to 4 kHz	0.60 dB
4. Acoustic signal test of frequency weightings at >4 kHz to 10 kHz	0.70 dB
5. Electrical signal test of frequency weightings, Weighting network response with relative to 1 kHz	0.20 dB
6. Frequency and time weightings at 1kHz	0.20 dB
7. Long Term Stability	0.10 dB
8. Level linearity on the reference level range	0.30 dB
9. Level linearity including the level range control	0.30 dB
10. Tone burst response	0.30 dB
11. Peak C Sound level	0.35 dB
12. Overload indication	0.25 dB
13. High Level Stability	0.10 dB

- Acceptance limit and Maximum-permitted Uncertainty was IEC 61672-1:2013

End of Certificate

The results related only to the item calibrated. The certificate shall not be reproduced except in full, without written approval of the Innovative Instrument Co., Ltd
FM-708-SLM-01 Rev.02 Issue date: 7/11/23

Certificate No : 24-SLM-042
Request No : Req-2024-0227

9. Level linearity including the level range control

UUC Setting	STD	Measured	UNCERTAINTY	Acceptance Limit
FAST / A	REF (dB)	UUC (dB)	(± dB)	(± dB)
UUC Range				
20-140	24.90	25.1	0.2	0.8
	114	114.0	0.0	0.8

10. Tone burst response

UUC Setting	STD	Anticipated	Measured	UNCERTAINTY	Acceptance Limit
A / 20-140	Toneburst (ms)	Ref (dB)	UUC (dB)	ERR (dB)	(± dB)
UUC Time Response					
Fast	200	136.0	136.0	0.0	0.5
	2	119.0	118.9	-0.1	+1.0, -1.5
	0.25	110.0	109.9	-0.1	+1.0, -3.0
Slow	200	129.6	129.6	0.0	0.5
	2	110.0	110.0	0.0	+1.0, -3.0
	200	130.0	130.0	0.0	0.5
SEL	2	110.0	110.0	0.0	+1.0, -1.5
	0.25	101.0	100.9	-0.1	+1.0, -3.0

11. Peak C Sound level

UUC Setting	Anticipated	Measured	UNCERTAINTY	Acceptance Limit
FAST / C / 20-140	REF (dB)	UUC (dB)	ERR (dB)	(± dB)
STD Setting				
Complete cycle	135.4	135.7	+0.30	2.0
Positive half cycle	134.4	134.2	-0.20	1.0
Negative half cycle	134.4	134.2	-0.20	1.0

The results related only to the item calibrated. The certificate shall not be reproduced except in full, without written approval of the Innovative Instrument Co., Ltd
FM-708-SLM-01 Rev.02 Issue date: 7/11/23



INNOVATIVE INSTRUMENT CALIBRATION LAB
INNOVATIVE INSTRUMENT CO., LTD. HEAD OFFICE
719 MOO 13, SOI SINTINAKORN 11 TAMBON BANG KAEU,
AMPHOE BANG PHU, SAMUT PRAKAN PROVINCE 10540 THAILAND
TEL: 66(0)2116-5860-1 FAX: 66(0)2116-7140

Certificate of Calibration

Customer
Name : SGS (Thailand) Limited.
Address : 100 Nanglinchee Road, Chongnonsi, Yamaswa Bangkok
10120

Certificate No : 23-ACT-138

Request No : Req-2023-1892

Unit Under Calibration Details

Measurement item : Acoustic Calibrator
Manufacturer : Cirrus
Model : CR-515
Serial Number : 88350
ID : ENSL 19175

Class : 1

Range : 94 dB / 1000 Hz

Instrument Status : Used

Calibration Environment and Details

Temperature : (23 ±2 °C)
Humidity : (50 ± 20 %RH)
Barometric Pressure : (1013 ±10.0 hPa)
Received Date : 4 September 2023
Calibration Date : 18 September 2023
Location of Calibration : LAB 1 Acoustic

Calibration Procedure : In-house method CP-ACT-02 based on IEC 60942:2017 Electroacoustics - Sound calibrators

Reference Standard	Model	Serial Number	Traceable	Due Calibration
Sound Calibrator	SV 35A	58079	EEL	31 May 2024
THD Multimeter	2015	1047765	NIMT	31 January 2024

Traceability : This certificate provides traceability of measurement to recognized national standard, and to the realization of the international System of Units (SI).

Note

The reported uncertainty is based on standard uncertainty multiplied by the Coverage Factor $k=2$, providing a level of

confidence approximately 95 %.



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INNOVATIVE INSTRUMENT CO., LTD. HEAD OFFICE
719 MOO 13, SOI SINTINAKORN 11 TAMBON BANG KAEU,
AMPHOE BANG PHU, SAMUT PRAKAN PROVINCE 10540 THAILAND
TEL: 66(0)2116-5860-1 FAX: 66(0)2116-7140

Certificate No : 23-ACT-138

Request No : Req-2023-1892

Calibration Results : Without Adjustment

Sound pressure level

Calibration Range (dB)	Without Adjustment (dB)		Adjustment (dB)		Uncertainty (± dB)	Acceptance limit Class 1 (± dB)
	Measured	Error	Measured	Error		
94 dB / 1000 Hz	93.95	-0.05	-	-	0.13	0.25

Frequency of Sound pressure level

Calibration Range (Hz)	Without Adjustment		Adjustment		Uncertainty (± %)	Acceptance limit Class 1 (± %)
	Measured (Hz)	Error (%)	Measured (Hz)	Error (%)		
94 dB / 1000 Hz	1000.00	0.00	-	-	0.01	0.70

Total Harmonic Distortion plus Noise of Sound pressure level (THD+N %)

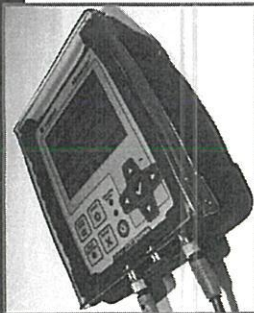
Calibration Range (Hz)	Without Adjustment		Adjustment		Uncertainty (± %)	Acceptance limit Class 1 (± %)
	Measured (%)	Error (%)	Measured (%)	Error (%)		
94 dB / 1000 Hz	0.07	-	-	-	0.40	2.5

Note

- Acceptance limit was IEC60942:2017 Class 1
- The calibration results exclude the calibration pressure correction
- The calibration results exclude the microphone volume correction

End of Calibration

Micromate Protective Boot and Cover (Part No. 721A0301)



This technical bulletin provides an overview of the Micromate Protective Boot and Cover (Part No. 721A0301) and installation.

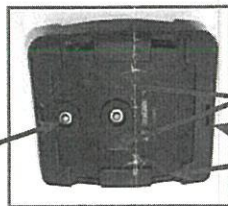
The Micromate Protective Boot and Cover have been specifically designed to protect the Micromate unit and provide flexibility when mounting the unit. The robust protective boot and separate protective cover offer easy-on, easy-off installation.

The Protective Boot

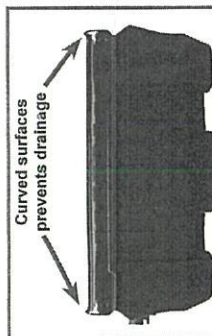
The protective boot is made of a durable silicon based compound. This material has been designed to handle temperature extremes in excess of -50°C (-58°F to 212°F) and still remain flexible.

The boot provides protection from impact, foreign objects, prevents water from pooling around the unit and provides several options for mounting the Micromate.

Mounting holes with hardware



Straps and Drainage Slots



Wall mounted - cover opens Down



Hand held - cover opens up

Attaching the Protective Boot to the Micromate

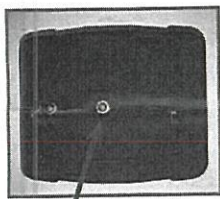
The Protective Boot fits securely around the Micromate unit. However, to help ensure the Micromate remains in the protective boot, the boot can be secured to the back of the Micromate unit with two screws. This will provide additional protection when units are not assigned to a specific individual or if the units are part of a rental fleet.



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Micromate Protective Boot and Cover (Part No. 721A0301)

- 1) Insert the Micromate unit into the boot with the top on the unit in the direction of the arrows in the boot.
- 2) Turn the unit over so the back of the boot is accessible.
- 3) Locate the two mounting holes.
- 4) Using two 6-32 UNC x 1/2" pan head screws (M3.5 x 0.6), #6 x .38 OD lock washers and #6 x .38 OD flat washers (9.6mm), loosely fasten the Protective Boot to the Micromate.
- 5) Tighten, but do not over-tighten the screws.



Mounting holes with hardware

Mounting holes with hardware

Installing the Micromate in a Remote Station

The Micromate Protective Boot can also be used to make the installation in a remote station simpler and more flexible. The boot can be secured to the back plate of the remote station before the Micromate unit is inserted into the boot. This will make your remote station quicker to install, reduce down time for routine tasks, like annual calibration, by allowing units to be removed and reinstalled much quicker.

The photos below show one example of a remote station installation. Many other options are possible.

- 1) Arrange all of the parts, including cables, to be installed in the enclosure to achieve the best fit possible.



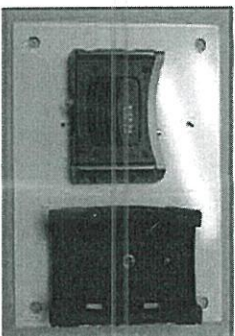
Placement of modem, Micromate and cables

- 2) Mark and drill the required holes in the mount surface.

721A0301 Rev 01 - Product Specifications are Subject to Change

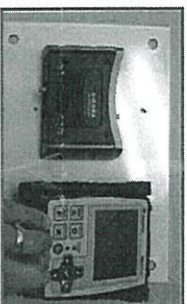
Micromate Protective Boot and Cover (Part No. 721A0301)

- 3) Secure the individual parts, the Modem and Micromate protective boot in this example, to the mounting surface.



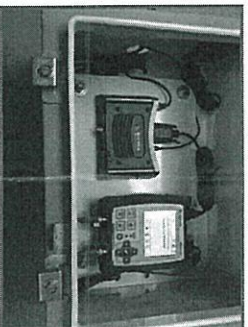
Modem and Protective Boot secured

- 4) Install the Micromate into the protective boot.



Install the Micromate in the Protective Boot

- 5) Install the mounting panel in the enclosure.
- 6) Pass the geophone and microphone cables through the access hole in the enclosure.



Install the mounting panel in the enclosure, and connect the cables and sensors

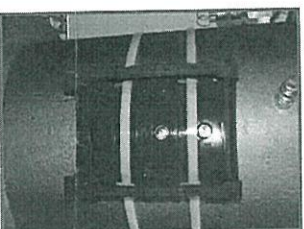
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Micromate Protective Boot and Cover (Part No. 721A0301)

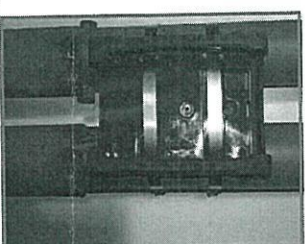
- 7) Connect the geophone and microphone to the Micromate.
- 8) Connect the RS-232 to USB cable from the modem to the Micromate.
- 9) Pass the antenna cable through the access hole of the enclosure and connect it to the modem.
- 10) Connect the power adaptors to both the modem and the Micromate.
- 11) Configure the Micromate for remote access. Refer to section 11.4.4 Auto Call Home of the Micromate Operator manual for additional information.

Round and Irregular Surface Installation

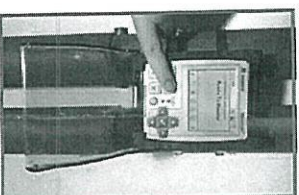
When it is not possible or convenient to use screws to secure the Micromate in place, the protective boot can be held in place with large plastic tie-wraps or metal straps. The slots in the bottom of the boot provide space for these straps while not interfering with the installation of the unit.



Micromate Protective Boot attached with Tie-wraps



Micromate Protective Boot attached with Metal Straps



Accessing the Installed Micromate

Instantel

Corporate Office:
3091 Legat Drive,
St. Catharines, ON L2K 3A3
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US Office:
808 Commerce Park Drive,
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Email: sales@instantel.com

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The World's Most Trusted Vibration Monitors

Certificate of Calibration

Issued by : Vibration Laboratory

Certificate No. : 23V028

Reference No. : CBLUE01V004

Received Date : 17 March 2023

Calibrated Date : 29 March 2023

Page 1 of 5

Client : SGS (Thailand) Limited

Address : 100 Nanglaechee Road, Chongnonsi, Yannawa Bangkok 10120

Equipment : VIBRATION METER

Manufacture/Brand : INSTANTEL

Model : Micromate

Serial No./ ID No. : UM7002 / ENSL16117

This certificate is issued in accordance with the conditions of accreditation granted by The National Accreditation Council of Thailand which has assessed the measurement capability of the laboratory and its traceability to recognised national standards and to the units of measurement realised at the corresponding national standards laboratory. This certificate may not be reproduced other than in full, except with the prior written approval of the head of Calibration services and environmental analysis department. This reported measurement result relates only the measurand and applies only at the time of measurement.

FM-02/QP-MCC-09 Rev.4
e-mail : MCC@egat.co.th



Standard Used

The table below is described the calibrator through the International System of Unit.

Description	Manufacture/Model	Serial No.	Traceable No.	Due Date
Conditioning Amplifier Type 2626	Bruel & Kjaer	1242376	AV-0003-23	23 January 2025
Accelerometer Type 8305	Bruel & Kjaer	2378223	AV-0012-22	11 July 2024
Digital Multimeter 8846A	FLUKE	4330020	22E507	26 September 2023

Ambient Environment :

The Calibration was performed in an environment of $(23 \pm 2) ^\circ \text{C}$ and $(50 \pm 10) \%$ relative humidity.

Measurement Method :

The unit under calibration was calibrated by comparison with standard accelerometer. The calibration method is based on WP-MCC-E-301 by comparison with reference accelerometer standard .

Measurement Results

The measurement results, labeled in the following pages give the calibration results and associated with measurement uncertainties.

Measurement Uncertainty

The Measurement Uncertainty are labeled on the following pages Completed the expanded uncertainty, that was calculated in accordance with the method in M3003, using coverage factor $k = 2$. The value of the measured lies within the assigned ranges of values of confidence level of approximately 95%.

Traceability :

The measurement is traceable to the International System of Unit through

- The National Institute of Metrology (Thailand)
- Metrology and Calibration Department



Metrology and Calibration Department
Electrical Maintenance Division
Electricity Generating Authority of Thailand

Continued of Calibration Report

Certificate Number. 23V028

Page 3 of 5

DESCRIPTION	INSTRUMENT VALUE		UNCERTAINTY
	STANDARD SETTING	UUC READING	
Vertical Frequency (Hz)	mm/s _p	mm/s _p	± mm/s _p
*20	10.00	10.19	0.15
*30	10.00	10.02	0.15
40	10.00	10.14	0.15
80	10.00	10.15	0.15

* Calibration marked "Not TSI Accredited" in this Certificate have been included for completeness.

Transducer Part : ENSL 16117

Condition : Installation by vertical direction



Metrology and Calibration Department
Electrical Maintenance Division
Electricity Generating Authority of Thailand

Continued of Calibration Report

Certificate Number. 23V028

Page 4 of 5

DESCRIPTION	INSTRUMENT VALUE		UNCERTAINTY
	STANDARD SETTING	UUC READING	
Transverse Frequency (Hz)	mm/s _p	mm/s _p	± mm/s _p
*20	10.00	10.23	0.15
*30	10.00	10.02	0.15
40	10.00	9.99	0.14
80	10.00	9.89	0.14

* Calibration marked "Not TSI Accredited" in this Certificate have been included for completeness.

Transducer Part : ENSL 16117

Condition : Installation by Transverse direction



Metrology and Calibration Department
Electrical Maintenance Division
Electricity Generating Authority of Thailand

DESCRIPTION	INSTRUMENT VALUE		UNCERTAINTY
	STANDARD SETTING	LUC READING	
Longitude	mm/s _p	mm/s _p	± mm/s _p
Frequency (Hz)			
*20	10.00	10.16	0.15
*30	10.00	10.05	0.15
40	10.00	10.03	0.15
80	10.00	9.97	0.14

Calibration marked "Not TISI Accredited" in this Certificate have been included for completeness.

Transducer Part: ENSL 16117

Condition : Installation by Longitude direction

*** End Certificate of Calibration ***

Certificate of Calibration

Issued by : Vibration Laboratory

Certificate No.	: 23V029
Reference No.	: CBLUE04V007
Received Date	: 17 March 2023
Calibrated Date	: 29 March 2023

Page 1 of 5

Client	: SGS (Thailand) Limited
Address	: 100 Nanglinhee Road, Chongrosai, Yannawa Bangkok 10120
Equipment	: VIBRATION METER
Manufacture /Brand	: INSTANTEL
Model	: Micromate
Serial No./ ID No.	: UM7003 / ENSL 16118

This certificate is issued in accordance with the conditions of accreditation granted by The National Accreditation Council of Thailand which has assessed the measurement capability of the laboratory and its traceability to recognised national standards and to the units of measurement realised at the corresponding national standards laboratory. This certificate may not be reproduced other than in full, except with the prior written approval of the head of Calibration services and environmental analysis department. This reported measurement result relates only the measurand and applies only at the time of measurement.

Form-02/QP-MCC-09 Rev.4
e-mail : MCC@negat.co.th



Metrology and Calibration Department
Electrical Maintenance Division
Electricity Generating Authority of Thailand

Continued of Calibration Report Certificate Number. 23V029 Page 2 of 5

Standard Used

The table below is described the calibrator through the International System of Unit.

Description	Manufacture/Model	Serial No.	Traceable No.	Due Date
Conditioning Amplifier Type 2626	Briel & Kjaer	1242376	AV-0003-23	23 January 2025
Accelerometer Type 8305	Briel & Kjaer	2378223	AV-0012-22	11 July 2024
Digital Multimeter /8846A	FLUKE	4330020	22E507	26 September 2023

Ambient Environment :

The Calibration was performed in an environment of (23 ± 2) °C and (50 ± 10) % relative humidity.

Measurement Method :

The unit under calibration was calibrated by comparison with standard accelerometer. The calibration method is based on WI-MCCE-301 by comparison with reference accelerometer standard .

Measurement Results

The measurement results, labeled in the following pages give the calibration results and associated with measurement uncertainties.

Measurement Uncertainty

The Measurement Uncertainty are labeled on the following pages Completed the expanded uncertainty, that was calculated in accordance with the method in M3003, using coverage factor $k = 2$. The value of the measured lies within the assigned ranges of values of confidence level of approximately 95%.

Traceability :

The measurement is traceable to the International System of Unit through
- The National Institute of Metrology (Thailand)
- Metrology and Calibration Department



Metrology and Calibration Department
Electrical Maintenance Division
Electricity Generating Authority of Thailand

Continued of Calibration Report Certificate Number. 23V029 Page 3 of 5

DESCRIPTION	INSTRUMENT VALUE		UNCERTAINTY
	STANDARD SETTING	LUC READING	
Vertical Frequency (Hz)	mm/s _p	mm/s _p	± mm/s _p
	*20	10.00	0.15
	*30	10.00	0.15
	40	10.00	0.15
80	10.00	10.12	0.15

* Calibration marked "Not TISI Accredited" in this Certificate have been included for completeness.

Transducer Part : ENSL 16118

Condition : Installation by vertical direction



DESCRIPTION	INSTRUMENT VALUE		UNCERTAINTY
	STANDARD SETTING	UUC READING	
Transverse Frequency (Hz)	mm/s _p	mm/s _p	± mm/s _p
	*20 10.00	10.23	0.15
	*30 10.00	10.11	0.15
	40 10.00	10.09	0.15
	80 10.00	10.01	0.15

* Calibration marked "Not TISI Accredited" in this Certificate have been included for completeness.

Tranducer Part : ENSL 16118

Condition : Installation by Transverse direction



DESCRIPTION	INSTRUMENT VALUE		UNCERTAINTY
	STANDARD SETTING	UUC READING	
Longitude Frequency (Hz)	mm/s _p	mm/s _p	± mm/s _p
	*20 10.00	10.21	0.15
	*30 10.00	10.08	0.15
	40 10.00	10.03	0.15
	80 10.00	9.93	0.14

* Calibration marked "Not TISI Accredited" in this Certificate have been included for completeness.

Tranducer Part : ENSL 16118

Condition : Installation by Longitude direction

** End Certificate of Calibration **



CMC.L.16119

Certificate of Calibration

Issued by : Vibration Laboratory
Certificate No. : 23V030
Reference No. : CBLCE01V1008
Received Date : 17 March 2023
Calibrated Date : 30 March 2023
Page 1 of 5

Client : SGS (Thailand) Limited
Address : 100 Nanglinchoe Road, Chongnonsi, Yomwua Bangkok 10120
Equipment : VIBRATON METER
Manufacture /Brand : INSTANTEL
Model : Micromate
Serial No./ ID No. : UN7004 / ENSL 16119

This certificate is issued in accordance with the conditions of accreditation granted by The National Accreditation Council of Thailand which has assessed the measurement capability of the laboratory and its measurability to recognised national standards and to the units of measurement realised at the corresponding national standards laboratory. This certificate may not be reproduced other than in full, except with the prior written approval of the head of Calibration services and environmental analysis department. This reported measurement result relates only the measured and applies only at the time of measurement.

FM-02-OP-MCC-09 Rev.4
e-mail : MCC@ega.co.th



Continued of Calibration Report Certificate Number: 23V030

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Standard Used

The table below is described the calibrator through the International System of Unit.

Description	Manufacturer/Model	Serial No.	Traceable No.	Due Date
Conditioning Amplifier Type 2626	Brüel & Kjær	1242376	AV-0903-23	23 January 2025
Accelerometer Type 8305	Brüel & Kjær	2378223	AV-0012-22	11 July 2024
Digital Multimeter /8846A	FLUKE	4330020	22E307	26 September 2023

Ambient Environment :

The Calibration was performed in an environment of $(23 \pm 2) ^\circ \text{C}$ and $(50 \pm 10) \%$ relative humidity.

Measurement Method :

The unit under calibration was calibrated by comparison with standard accelerometer. The calibration method is based on W1-MCC-E-301 by comparison with reference accelerometer standard .

Measurement Results

The measurement results, labeled in the following pages give the calibration results and associated with measurement uncertainties.

Measurement Uncertainty

The Measurement Uncertainty are labeled on the following pages Completed the expanded uncertainty, that was calculated in accordance with the method in M3003, using coverage factor $k = 2$. The value of the measured lies within the assigned ranges of values of confidence level of approximately 95%.

Traceability :

- The measurement is traceable to the International System of Unit through
- The National Institute of Metrology (Thailand)
 - Metrology and Calibration Department



Metrology and Calibration Department
Electrical Maintenance Division
Electricity Generating Authority of Thailand

Continued of Calibration Report

Certificate Number. 23V030

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Metrology and Calibration Department
Electrical Maintenance Division
Electricity Generating Authority of Thailand

Continued of Calibration Report

Certificate Number. 23V030

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DESCRIPTION	INSTRUMENT VALUE		UNCERTAINTY
	STANDARD SETTING	UUC READING	
Vertical Frequency (Hz)	mm/s _p	mm/s _p	± mm/s _p
	*20 10.00	10.40	0.15
	*30 10.00	10.27	0.15
	40 10.00	10.16	0.15
	80 10.00	10.09	0.15

* Calibration marked "Not TISI Accredited" in this Certificate have been included for completeness.

Tranducer Part : ENSL 16119

Condition : Installation by vertical direction

DESCRIPTION	INSTRUMENT VALUE		UNCERTAINTY
	STANDARD SETTING	UUC READING	
Transverse Frequency (Hz)	mm/s _p	mm/s _p	± mm/s _p
	*20 10.00	10.39	0.15
	*30 10.00	10.10	0.15
	40 10.00	10.05	0.15
	80 10.00	9.95	0.14

* Calibration marked "Not TISI Accredited" in this Certificate have been included for completeness.

Tranducer Part : ENSL 16119

Condition : Installation by Transverse direction



Metrology and Calibration Department
Electrical Maintenance Division
Electricity Generating Authority of Thailand

Continued of Calibration Report

Certificate Number: 23V030

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DESCRIPTION	INSTRUMENT VALUE		UNCERTAINTY
	STANDARD SETTING	BUC READING	
Longitude Frequency (Hz)	mm/s _r	mm/s _r	± mm/s _r
*20	10.00	10.38	0.15
*30	10.00	10.20	0.15
40	10.00	10.11	0.15
80	10.00	10.02	0.15

* Calibration marked "Not TISI Accredited" in this Certificate have been included for completeness.

Transducer Part : ENSL 16119

Condition : Installation by Longitude direction

** End Certificate of Calibration **



Metrology and Calibration Department
Electrical Maintenance Division
Electricity Generating Authority of Thailand

81 Moo 11 Bangkrasai - Samut Kdei, Samut, Nonthaburi 11150 Tel. (662) 436-8789 Ext. 6155



MSC-TISI-715 17025
CALIBRATION 0218

Certificate of Calibration

Issued by : Vibration Laboratory

Certificate No. : 24V032

Reference No. : CH.EE01V011

Received Date : 14 March 2024

Calibrated Date : 21 March 2024

Page 1 of 5

Client : Blue Consultant Limited Partnership

Address : 32/751 Prachin - Uthit Rd., Thung Khru, Bangkok 10140

Equipment : VIBRATION METER

Manufacture/Brand : INSTANTEL

Model : Micronate

Serial No./ ID No. : UMI0933

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Standard Used

The table below is described the calibrator through the International System of Unit.

Description	Manufacture/Model	Serial No.	Traceable No.	Due Date
Conditioning Amplifier Type 2626	Bruel & Kjaer	1242376	AV-0003-23	23 January 2025
Accelerometer Type 8305	Bruel & Kjaer	1262817	AV-0014-23	28 March 2025
Digital Multimeter 8846A	FLUKE	4330020	23E531	02 October 2024

Ambient Environment :

The Calibration was performed in an environment of $(23 \pm 2) ^\circ \text{C}$ and $(50 \pm 10) \%$ relative humidity.

Measurement Method :

The unit under calibration was calibrated by comparison with standard accelerometer. The calibration method is based on ISO 16063-21 : 2003(E) by comparison with reference accelerometer standard .

Measurement Results

The measurement results, labeled in the following pages give the calibration results and associated with measurement uncertainties.

Measurement Uncertainty

The Measurement Uncertainty are labeled on the following pages Completed the expanded uncertainty, that was calculated in accordance with the method in ME3003, using coverage factor $k = 2$. The value of the measured lies within the assigned ranges of values of confidence level of approximately 95%.

Traceability :

The measurement is traceable to the International System of Unit through

- The National Institute of Metrology (Thailand)
- Metrology and Calibration Department



DESCRIPTION	INSTRUMENT VALUE		UNCERTAINTY
	STANDARD SETTING	LUC READING	
Vertical Frequency (Hz)	mm/s _p 10.00	mm/s _p 10.12	± mm/s _p 0.15
	*20 10.00	10.27	0.15
	*30 10.00	10.34	0.15
	40 10.00	10.35	0.15

* Calibration marked "Not TISI Accredited" in this Certificate have been included for completeness.

Transducer S/N : UM110933

Condition : Installation by vertical direction



Metrology and Calibration Department
Electrical Maintenance Division
Electricity Generating Authority of Thailand

Continued of Calibration Report

Certificate Number: 24V032

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DESCRIPTION	INSTRUMENT VALUE		UNCERTAINTY
	STANDARD SETTING	UCC READING	
Transverse Frequency (Hz)	mm/s _p	mm/s _p	± mm/s _p
*20	10.00	10.33	0.15
*30	10.00	10.39	0.15
40	10.00	10.43	0.15
80	10.00	10.46	0.15

* Calibration marked "Not TISI Accredited" in this Certificate have been included for completeness.

Transducer S/N: UM10933

Condition : Installation by Transverse direction



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Electrical Maintenance Division
Electricity Generating Authority of Thailand

Continued of Calibration Report

Certificate Number: 24V032

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DESCRIPTION	INSTRUMENT VALUE		UNCERTAINTY
	STANDARD SETTING	UCC READING	
Longitude Frequency (Hz)	mm/s _p	mm/s _p	± mm/s _p
*20	10.00	9.89	0.14
*30	10.00	9.83	0.14
40	10.00	9.83	0.14
80	10.00	9.76	0.14

* Calibration marked "Not TISI Accredited" in this Certificate have been included for completeness.

Transducer S/N: UM10933

Condition : Installation by Longitude direction

** End Certificate of Calibration **

Certificate of Calibration

Issued by : Vibration Laboratory Certificate No. : 24V/033
Reference No. : CHLCE01V012
Received Date : 14 March 2024
Calibrated Date : 22 March 2024
Page 1 of 5

Client : Blue Consultant Limited Partnership
Address : 32751 Prachin - Uthit Rd., Thung Khru, Bangkok 10140
Equipment : VIBRATION METER
Manufacture /Brand : INSTANTEL
Model : Micromate
Serial No./ ID No. : UM21455

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FM-02/QP-MCC-09 Rev.4
e-mail : MCC@egat.co.th

Standard Used
The table below is described the calibrator through the International System of Unit.

Description	Manufacture/Model	Serial No.	Traceable No.	Due Date
Conditioning Amplifier Type 2626	Briel & Kjaer	1242376	AV-0003-23	23 January 2025
Accelerometer Type 8305	Briel & Kjaer	1262817	AV-0014-23	28 March 2025
Digital Multimeter/8846A	FLUKE	4330020	23E531	02 October 2024

Ambient Environment :
The Calibration was performed in an environment of $(23 \pm 2) ^\circ \text{C}$ and $(50 \pm 10) \%$ relative humidity.

Measurement Method :
The unit under calibration was calibrated by comparison with standard accelerometer. The calibration method is based on ISO 16063-21 : 2003(E) by comparison with reference accelerometer standard .

Measurement Results
The measurement results, labeled in the following pages give the calibration results and associated with measurement uncertainties.

Measurement Uncertainty
The Measurement Uncertainty are labeled on the following pages Completed the expanded uncertainty, that was calculated in accordance with the method in M3003, using coverage factor $k = 2$. The value of the measured lies within the assigned ranges of values of confidence level of approximately 95%.

Traceability :
The measurement is traceable to the International System of Unit through

- The National Institute of Metrology (Thailand)
- Metrology and Calibration Department



Metrology and Calibration Department
Electrical Maintenance Division
Electricity Generating Authority of Thailand

Continued of Calibration Report

Certificate Number: 24V033

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DESCRIPTION	INSTRUMENT VALUE		UNCERTAINTY
	STANDARD SETTING	UIC READING	
Vertical			
Frequency (Hz)	mm/s _p	mm/s _p	± mm/s _p
*20	10.00	10.33	0.15
*30	10.00	10.28	0.15
40	10.00	10.25	0.15
80	10.00	10.18	0.15

* Calibration marked "Not TISI Accredited" in this Certificate have been included for completeness.

Transducer S/N : UM21455

Condition : Installation by vertical direction



Metrology and Calibration Department
Electrical Maintenance Division
Electricity Generating Authority of Thailand

Continued of Calibration Report

Certificate Number: 24V033

Page 4 of 5

DESCRIPTION	INSTRUMENT VALUE		UNCERTAINTY
	STANDARD SETTING	UIC READING	
Transverse			
Frequency (Hz)	mm/s _p	mm/s _p	± mm/s _p
*20	10.00	10.31	0.15
*30	10.00	10.24	0.15
40	10.00	10.20	0.15
80	10.00	10.14	0.15

* Calibration marked "Not TISI Accredited" in this Certificate have been included for completeness.

Transducer S/N : UM21455

Condition : Installation by Transverse direction

DESCRIPTION	INSTRUMENT VALUE		UNCERTAINTY
	STANDARD SETTING	ULC READING	
Longitude Frequency (Hz)	mm/s _p	mm/s _p	± mm/s _p
	*20	10.23	0.15
	*30	10.11	0.15
	40	10.09	0.15
	80	10.01	0.15

* Calibration marked "Not TISI Accredited" in this Certificate have been included for completeness.

Transducer S/N : UM21455

Condition : Installation by Longitude direction

** End Certificate of Calibration **

Certificate of Calibration

Issued by : Vibration Laboratory

Certificate No. : 24V034

Reference No. : CBLUE01V013

Received Date : 14 March 2024

Calibrated Date : 25 March 2024

Page 1 of 5

Client : Blue Consultant Limited Partnership

Address : 32/751 Pracha - Uthit Rd., Thung Khru, Bangkok 10140

Equipment : VIBRATION METER

Manufacture /Brand : INSTANTEL

Model : Micrumate

Serial No./ ID No. : UM21456

This certificate is issued in accordance with the conditions of accreditation granted by The National Accreditation Council of Thailand which has assessed the measurement capability of the laboratory and its traceability to recognised national standards and to the units of measurement realised at the corresponding national standards laboratory. This certificate may not be reproduced other than in full, except with the prior written approval of the head of Calibration services and environmental analysis department. This reported measurement result relates only the measurand and applies only at the time of measurement.



Metrology and Calibration Department
Electrical Maintenance Division
Electricity Generating Authority of Thailand

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Metrology and Calibration Department
Electrical Maintenance Division
Electricity Generating Authority of Thailand

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Certificate Number. 24V034

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Standard Used

The table below is described the calibrator through the International System of Unit.

Description	Manufacturer/Model	Serial No.	Traceable No.	Due Date
Conditioning Amplifier Type 2626	Briel & Kjaer	1242376	AV-0003-23	23 January 2025
Accelerometer Type 8305	Briel & Kjaer	1262817	AV-0014-23	28 March 2025
Digital Multimeter /8846A	FLUKE	4330020	23E331	02 October 2024

Ambient Environment :

The Calibration was performed in an environment of $(23 \pm 2) ^\circ \text{C}$ and $(50 \pm 10) \%$ relative humidity.

Measurement Method :

The unit under calibration was calibrated by comparison with standard accelerometer. The calibration method is based on ISO 16063-21 : 2003(E) by comparison with reference accelerometer standard .

Measurement Results

The measurement results, labeled in the following pages give the calibration results and associated with measurement uncertainties.

Measurement Uncertainty

The Measurement Uncertainty are labeled on the following pages Completed the expanded uncertainty, that was calculated in accordance with the method in M3003, using coverage factor $k = 2$. The value of the measured lies within the assigned ranges of values of confidence level of approximately 95%.

Traceability :

- The measurement is traceable to the International System of Unit through
- The National Institute of Metrology (Thailand)
 - Metrology and Calibration Department

DESCRIPTION	INSTRUMENT VALUE		UNCERTAINTY
	STANDARD SETTING	U/C READING	

Vertical Frequency (Hz)	mm/s_p	mm/s_p	$\pm \text{mm/s}_p$
	10.00	10.09	0.15
	*30	10.10	0.15
	40	10.10	0.15
	80	10.06	0.15

* Calibration marked "Not TISI Accredited" in this Certificate have been included for completeness.

Transducer S/N : DM21456

Condition : Installation by vertical direction



Metrology and Calibration Department
Electrical Maintenance Division
Electricity Generating Authority of Thailand

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Metrology and Calibration Department
Electrical Maintenance Division
Electricity Generating Authority of Thailand

Continued of Calibration Report

Certificate Number. 24V034

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DESCRIPTION	INSTRUMENT VALUE		UNCERTAINTY
	STANDARD SETTING	U/C READING	
Transverse Frequency (Hz)	mm/s _p	mm/s _p	± mm/s _p
*20	10.00	10.16	0.15
*30	10.00	10.07	0.15
40	10.00	10.03	0.15
80	10.00	9.96	0.14

* Calibration made "Not TISI Accredited" in this Certificate have been included for completeness.

Transducer S/N : UM21456

Condition : Installation by Transverse direction

DESCRIPTION	INSTRUMENT VALUE		UNCERTAINTY
	STANDARD SETTING	U/C READING	
Longitude Frequency (Hz)	mm/s _p	mm/s _p	± mm/s _p
*20	10.00	10.21	0.15
*30	10.00	10.14	0.15
40	10.00	10.15	0.15
80	10.00	10.11	0.15

* Calibration made "Not TISI Accredited" in this Certificate have been included for completeness.

Transducer S/N : UM21456

Condition : Installation by Longitude direction

** End Certificate of Calibration **