ภาคผนวก ค

สำเนาใบรับรองการสอบเทียบเครื่องมือตรวจวัด

KINETICS
บริษัท ไคเนติคส์ คอร์ปอเรชั่น จำกัด
KINETICS CORPORATION LTD.

รายงานผลการซ่อมและปรับเทียบอุปกรณ์ตรวจวัดคุณภาพอากาศ

ลูกค้า / หน่วยงาน : SGS (Thailand) Co., Ltd.
รายชื่ออุปกรณ์ / เครื่องมือ : CO Analyzer
รุ่น/ยี่ห้ออุปกรณ์ / เครื่องมือ : T300
วันที่ : 20 กรกฎาคม 2566
บริษัทผู้ผลิต : Teledyne API
หมายเลขอุปกรณ์ / เครื่องมือ : 1885

	TEST VALUES API MODEL T300		BEFORE	AFTER
1	RANGE	1 - 1000 PPM	50.0	50.0
2	STABILITY	≤ 1 PPM	0.009	0.012
3	CO MEASURE	2500 - 4800 mV	3877.8	3764.6
4	CO REFERENCE	2000 - 4800 mV	3163.2	3070.8
5	MR RATIO	1.1 - 1.3	1.233	1.234
6	PRESSURE	25 - 35 in - Hg-A	29.2	29.3
7	SAMPLE FLOW	800 ± 10% cc/min	808	820
8	SAMPLE TEMP	48 ± 4 °C	45.5	45.4
9	BENCH TEMP	48 ± 2 °C	48.0	48.0
10	WHEEL TEMP	68 ± 2 °C	68.0	68.0
11	BOX TEMP	AMBIENT ± 5 °C	32.2	35.1
12	PHT DRIVE	250 - 4750 mV	3316.2	3311.0
13	CO SLOPE	1.0 ± 0.3	0.892	0.905
14	CO OFFSET	0.0 ± 0.3	0.024	0.024
15	CO READING (AMBIENT)	PPM	0.852	0.308
16	ELECTRICAL TEST	40 ± 2 PPM	1100.000	40.132
17	VOLTAGE TEST	+5 V +12 V +15 V -15 V	5.20 / 12.24 / 16.71 / -15.32	5.20 / 12.24 / 16.71 / -15.32
18	ZERO GAS	0.00 PPM	0.480	0.002
19	SPAN GAS	40.0 PPM	43.073	40.006

หมายเหตุ
- ทำการเปลี่ยน Spring 1 ชิ้น, Screwed Filter 1 ชิ้น, O-ring 2 ชิ้น

(คุณพรชัย ผาสิวนารักษ์)
ลงนามเจ้าหน้าที่ (Signature)

VERIFIED
BY: DWisok DATE: Aug 07 2023

ต้องการข้อมูลเพิ่มเติมทางด้านเทคนิค กรุณาติดต่อ : คุณพรชัย ผาสิวนารักษ์ โทรศัพท์ : 0-2515-8987
เลขที่ 388 ถนนรัชดาภิเษก แขวงจันทรเกษม เขตจตุจักร กรุงเทพฯ 10900 โทรศัพท์ : 0-2515-8999 โทรสาร : 0-2515-8988 E-Mail : info@kinetics.co.th

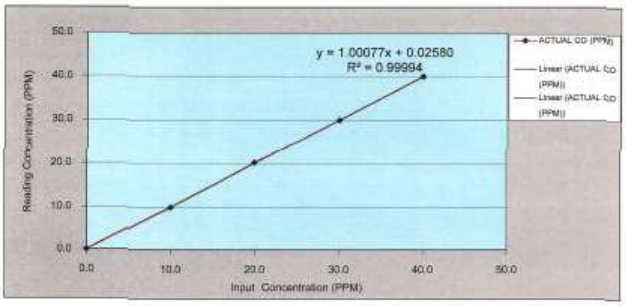
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MULTI POINT CALIBRATION REPORT

CUSTOMER NAME : SGS (Thailand) Co., Ltd.		
EQUIPMENT NAME : CO Analyzer		
MANUFACTURER : Teledyne - API	MODEL : T300	SERIAL NO : 1885
STANDARD GAS CONCENTRATION (PPM) : 4512		CYLINDER NO : CC745169
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



CALIBRATED BY : คุณพรชัย ผาสิวนารักษ์ DATE : 20 กรกฎาคม 2566
ต้องการข้อมูลทางด้านเทคนิคเพิ่มเติม : คุณพรชัย ผาสิวนารักษ์ โทรศัพท์ : 02-515-8987

เลขที่ 388 ถนนรัชดาภิเษก แขวงจันทรเกษม เขตจตุจักร กรุงเทพฯ 10900 โทรศัพท์ : 0-2515-8999 โทรสาร : 0-2515-8988 E-Mail : Info@kinetics.co.th

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Airgas
an Air Liquide company

Airgas Specialty Gases
Airgas USA, LLC
6141 Easton Road
Bldg 2
Plumsteadville, PA 18949
Airgas.com

CERTIFICATE OF ANALYSIS
Grade of Product: EPA Protocol

Part Number: E04NI99E15A0622
Cylinder Number: CC745169
Laboratory: 124 - Plumsteadville - PA
PGVP Number: A12021
Gas Code: CO,NO,NOX,SO2,BALN

Reference Number: 160-402045691-1
Cylinder Volume: 144.4 CF
Cylinder Pressure: 2015 PSIG
Valve Outlet: 660
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)" document EPA-600/R-12/531, using the assay procedures listed. Analytical Methodology does not require correction for analytical interference. This cylinder has a total analytical uncertainty as stated below with a confidence level of 95%. There are no significant impurities which affect the use of this calibration mixture. All concentrations are on a mole/mole basis unless otherwise noted.
Do Not Use This Cylinder below 100 psig, i.e. 5.7 megapascals.

ANALYTICAL RESULTS

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
SULFUR DIOXIDE	53.00 PPM	53.79 PPM	G1	+/- 0.9% NIST Traceable	03/03/2021, 03/10/2021
CARBON MONOXIDE	4500 PPM	4512 PPM	G1	+/- 0.6% NIST Traceable	03/04/2021
NITROGEN	Balance				

CALIBRATION STANDARDS

Type	Lot ID	Cylinder No	Concentration	Uncertainty	Expiration Date
NTRM	07060227	EB0079116	100.3 PPM NITRIC OXIDE/NITROGEN	+/- 1.0%	Jul 23, 2023
PRM	12386	DB65025	9.91 PPM AIR/NITROGEN DIOXIDE	2.0%	Feb 20, 2026
GMIS	124205889	CC323707	4.028 PPM NITROGEN DIOXIDE/NITROGEN	2.1%	Aug 15, 2021
NTRM	16010203	KAL003097	97.69 PPM SULFUR DIOXIDE/NITROGEN	+/-0.8%	Dec 23, 2021
NTRM	08012341	KAL004716	4857 PPM CARBON MONOXIDE/NITROGEN	+/- 0.6%	Jun 07, 2024

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

ANALYTICAL EQUIPMENT

Instrument/Make/Model	Analytical Principle	Last Multipoint Calibration
SIEMENS ULTRAMAT 6 N1KD579	NDIR	Feb 26, 2021
Nicolet IS50 FTIR AUP2010245 NO	FTIR	Feb 11, 2021
Nicolet IS50 FTIR AUP2010245 NO2	FTIR	Feb 22, 2021
Nicolet IS50 FTIR AUP2010245 SO2	FTIR	Feb 18, 2021

Triad Data Available Upon Request

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

Approved for Release

AAGM 1801

KINETICS
บริษัท ไคเนติคส์ คอร์ปอเรชั่น จำกัด
KINETICS CORPORATION LTD.

รายงานผลการซ่อมและปรับเทียบอุปกรณ์ตรวจวัดคุณภาพอากาศ

ลูกค้า / หน่วยงาน : SGS (Thailand) Co., Ltd.
รายชื่ออุปกรณ์ / เครื่องมือ : CO Analyzer
รุ่น/ยี่ห้ออุปกรณ์ / เครื่องมือ : T300
วันที่ : 20 กรกฎาคม 2566
บริษัทผู้ผลิต : Teledyne API
หมายเลขอุปกรณ์ / เครื่องมือ : 2550

	TEST VALUES API MODEL T300		BEFORE	AFTER
1	RANGE	1 - 1000 PPM	50.0	50.0
2	STABILITY	≤ 1 PPM	0.00	0.00
3	CO MEASURE	2500 - 4800 mV	3471.0	3494.4
4	CO REFERENCE	2000 - 4800 mV	2904.2	2931.0
5	MR RATIO	1.1 - 1.3	-	-
6	PRESSURE	25 - 35 in - Hg-A	29.4	29.6
7	SAMPLE FLOW	800 ± 10% cc/min	783.9	786.3
8	SAMPLE TEMP	48 ± 4 °C	44.8	44.7
9	BENCH TEMP	48 ± 2 °C	48.0	48.0
10	WHEEL TEMP	68 ± 2 °C	68.0	68.0
11	BOX TEMP	AMBIENT ± 5 °C	36.0	36.4
12	PHT DRIVE	250 - 4750 mV	-	-
13	CO SLOPE	1.0 ± 0.3	0.958	0.938
14	CO OFFSET	0.0 ± 0.3	-0.008	-0.007
15	CO READING (AMBIENT)	PPM	0.21	0.30
16	ELECTRICAL TEST	40 ± 2 PPM	-	-
17	VOLTAGE TEST	+5 V +12 V +15 V -15 V	5.23 / 12.23 / 16.58 / -15.17	5.23 / 12.23 / 16.58 / -15.17
18	ZERO GAS	0.00 PPM	-0.07	0.02
19	SPAN GAS	40.0 PPM	42.55	40.01

หมายเหตุ
- ทำการเปลี่ยน Spring 1 ชิ้น, Screwed Filter 1 ชิ้น, O-ring 2 ชิ้น

(คุณพรชัย ผาสิวนารักษ์)
ลงนามเจ้าหน้าที่ (Signature)

VERIFIED
BY: DWisok DATE: Aug 07 2023

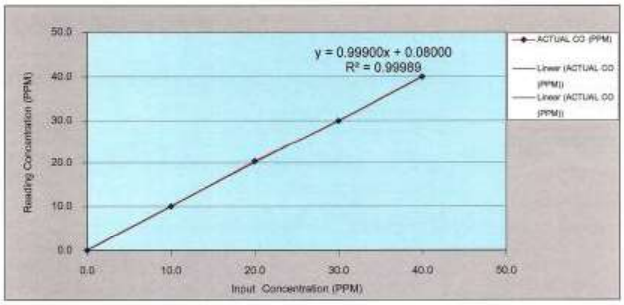
ต้องการข้อมูลเพิ่มเติมทางด้านเทคนิค กรุณาติดต่อ : คุณพรชัย ผาสิวนารักษ์ โทรศัพท์ : 0-2515-8987
เลขที่ 388 ถนนรัชดาภิเษก แขวงจันทรเกษม เขตจตุจักร กรุงเทพฯ 10900 โทรศัพท์ : 0-2515-8999 โทรสาร : 0-2515-8988 E-Mail : Info@kinetics.co.th

MULTI POINT CALIBRATION REPORT

CUSTOMER NAME : SGS (Thailand) Co., Ltd.		
EQUIPMENT NAME : CO Analyzer		
MANUFACTURER : Teledyne - API	MODEL : T300	SERIAL NO : 2550
STANDARD GAS CONCENTRATION (PPM) : 4512		CYLINDER NO : CC745169
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	0.02	0.02	0.00
1	10.00	10.00	0.00	0.00
2	20.00	20.35	0.35	1.75
3	30.00	29.92	-0.08	-0.27
4	40.00	40.01	0.01	0.02
AVERAGE (%)				0.51



CALIBRATED BY : คุณพรชัย ฉาศิวนารักษ์ DATE : 20 กรกฎาคม 2566

ต้องการข้อมูลทางด้านเทคนิคเพิ่มเติม : คุณพรชัย ฉาศิวนารักษ์ โทรศัพท์ : 02-515-8987

เลขที่ 388 ถนนรัชดาภิเษก แขวงจันทรเกษม เขตจตุจักร กรุงเทพฯ 10900 โทรศัพท์ : 0-2515-8999 โทรสาร : 0-2515-8988 E-Mail : info@kinetics.co.th

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Airgas
an Air Liquide company

Airgas Specialty Gases
Airgas USA, LLC
6141 Easton Road
Bldg 2
Plumsteadville, PA 18949
Airgas.com

CERTIFICATE OF ANALYSIS
Grade of Product: EPA Protocol

Part Number:	E04NI99E15A0622	Reference Number:	160-402045691-1
Cylinder Number:	CC745169	Cylinder Volume:	144.4 CF
Laboratory:	124 - Plumsteadville - PA	Cylinder Pressure:	2015 PSIG
PGVP Number:	A12021	Valve Outlet:	660
Gas Code:	CO,NO,NOX,SO2,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)" document EPA-600/R-12/531, using the assay procedures listed. Analytical Methodology does not require correction for analytical interference. This cylinder has a total analytical uncertainty as stated below with a confidence level of 95%. There are no significant impurities which affect the use of this calibration mixture. All concentrations are on a mole/mole basis unless otherwise noted.
Do Not Use This Cylinder below 100 psig, i.e. 0.7 megapascals.

ANALYTICAL RESULTS

Component	Requested Concentration	Actual Concentration	Protocol Method	Total Relative Uncertainty	Assay Dates
NOX	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
SULFUR DIOXIDE	53.00 PPM	53.79 PPM	G1	+/- 0.9% NIST Traceable	03/03/2021, 03/10/2021
CARBON MONOXIDE	4500 PPM	4512 PPM	G1	+/- 0.6% NIST Traceable	03/04/2021
NITROGEN	Balance				

CALIBRATION STANDARDS

Type	Lot ID	Cylinder No	Concentration	Uncertainty	Expiration Date
NTRM	07060227	EB0079116	100.3 PPM NITRIC OXIDE/NITROGEN	+/- 1.0%	Jul 23, 2023
PRM	12386	D655025	9.91 PPM AIR/NITROGEN DIOXIDE	2.0%	Feb 20, 2020
GMIS	124206889	CC323707	4.028 PPM NITROGEN DIOXIDE/NITROGEN	2.1%	Aug 15, 2021
NTRM	16010203	KAL003087	97.69 PPM SULFUR DIOXIDE/NITROGEN	+/-0.8%	Dec 23, 2021
NTRM	08012341	KAL004716	4867 PPM CARBON MONOXIDE/NITROGEN	+/- 0.6%	Jun 07, 2024

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

ANALYTICAL EQUIPMENT

Instrument/Make/Model	Analytical Principle	Last Multipoint Calibration
SIEMENS ULTRAMAT 6 N1KD676	NDIR	Feb 26, 2021
Nicolet IS50 FTIR AUP2010245 NO	FTIR	Feb 11, 2021
Nicolet IS50 FTIR AUP2010245 NO2	FTIR	Feb 22, 2021
Nicolet IS50 FTIR AUP2010245 SO2	FTIR	Feb 18, 2021

Triad Data Available Upon Request

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

Approved for Release

KINETICS
บริษัท ไคเนติคส์ คอร์ปอเรชั่น จำกัด
KINETICS CORPORATION LTD.

AFOM 25001

รายงานผลการซ่อมและปรับเทียบอุปกรณ์ตรวจวัดคุณภาพอากาศ

ลูกค้า / หน่วยงาน : SGS (Thailand) Co., Ltd.
ชื่ออุปกรณ์ / เครื่องมือ : CO Analyzer
รุ่นของอุปกรณ์ / เครื่องมือ : T300
วันที่ : 16 กุมภาพันธ์ 2567
บริษัทผู้ผลิต : Teledyne API
หมายเลขอุปกรณ์ / เครื่องมือ : 5881

	TEST VALUES API MODEL T300		BEFORE	AFTER
1	RANGE	1 - 1000 PPM	50.0	50.0
2	STABILITY	≤ 1 PPM	0.01	0.01
3	CO MEASURE	2500 - 4800 mV	3615	3939
4	CO REFERENCE	2000 - 4800 mV	3308	3361
5	MR RATIO	1.1 - 1.3	1.16	1.2
6	PRESSEURE	25 - 35 in - Hg-A	28.9	28.9
7	SAMPLE FLOW	800 ± 10% cc/min	827	827
8	SAMPLE TEMP	46 ± 4 °C	46.9	46.9
9	BENCH TEMP	48 ± 2 °C	48	48.0
10	WHEEL TEMP	68 ± 2 °C	68	67.9
11	BOX TEMP	AMBIENT ± 5 °C	34.6	37.4
12	PHT DRIVE	250 - 4750 mV	2430	2369
13	CO SLOPE	1.0 ± 0.3	1.059	1.057
14	CO OFFSET	0.0 ± 0.3	-0.049	-0.049
15	CO READING (AMBIENT)	PPM	0.732	0.269
16	ELECTRICAL TEST	40 ± 2 PPM	40.3	40.3
17	VOLTAGE TEST	+5 V +12 V +15 V -15 V	5.20 /12.15 /16.28 /-15.25	5.24/12.20 /16.40 /-15.30
18	ZERO GAS	0.00 PPM	-0.326	0.064
19	SPAN GAS	40.0 PPM	40.341	39.997

หมายเหตุ
- ทำการเปลี่ยน Sintered Filter 1 ชิ้น, Spring 1 ชิ้น, O-ring 2 ชิ้น
- ทำการ Calibrate Multi-Point

(คุณธนาคม มหาธาฯ)
ลงนามเจ้าหน้าที่ (Signature)

ต้องการข้อมูลเพิ่มเติมทางด้านเทคนิค กรุณาติดต่อ : คุณธนาคม มหาธาฯ โทรศัพท์ : 0-2515-8987

เลขที่ 388 ถนนรัชดาภิเษก แขวงจันทรเกษม เขตจตุจักร กรุงเทพฯ 10900 โทรศัพท์ : 0-2515-8999 โทรสาร : 0-2515-8988 E-Mail : info@kinetics.co.th

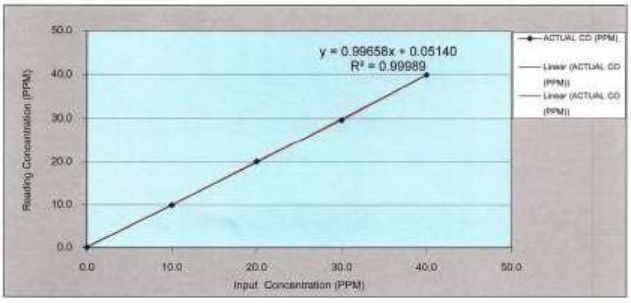
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MULTI POINT CALIBRATION REPORT

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			
	IDEAL (PPM)	ACTUAL CO (PPM)	ERROR CO (PPM)	% ERROR CO
ZERO	0.00	0.064	0.064	0.00
1	10.00	9.932	-0.068	-0.680
2	20.00	20.198	0.198	0.990
3	30.00	29.724	-0.276	-0.920
4	40.00	39.997	-0.003	-0.008
AVERAGE (%)				0.649



CALIBRATED BY : คุณธนาคม มหาธาฯ DATE : 16 /02 /2567

ต้องการข้อมูลทางด้านเทคนิคเพิ่มเติม : คุณธนาคม มหาธาฯ โทรศัพท์ : 02-515-8987

เลขที่ 388 ถนนรัชดาภิเษก แขวงจันทรเกษม เขตจตุจักร กรุงเทพฯ 10900 โทรศัพท์ : 0-2515-8999 โทรสาร : 0-2515-8988 E-Mail : info@kinetics.co.th

KINETICS

Environmental science business Unit

Customer service report

บริษัท เอส จี เอส (ประเทศไทย) จำกัด

Manufacturer	Equipment	Model
Teledyne API	CO Analyzer	T300
S/N	Quotation	
5881	-	

● Checking Date ●

16/02/2567

● Problem

B2



contact us

● Correlation working / Remark

1. ทำการเปลี่ยน Sintered Filter 1 ชิ้น , Spring 1 ชิ้น O-ring 2 ชิ้น
2. ทำการ Calibrate Multi-point

● Repair parts ●

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

Mr. Sujit

Technician / Engineer

KINETICS

บริษัท ไคเนติคส์ คอร์ปอเรชัน จำกัด

KINETICS CORPORATION LTD.

AABM 22004

รายงานผลการซ่อมและปรับเทียบอุปกรณ์ตรวจวัดคุณภาพอากาศ

ลูกค้า / หน่วยงาน : SGS (Thailand) Co., Ltd.
รายชื่ออุปกรณ์ / เครื่องมือ : NO_x Analyzer
รุ่นของอุปกรณ์ / เครื่องมือ : T200

วันที่ : 16 กุมภาพันธ์ 25667
บริษัทผู้ผลิต : Teledyne API
หมายเลขอุปกรณ์ / เครื่องมือ : 7533

TEST VALUES				
	API MODEL T200		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% cc/min	494	492
4	OZONE FLOW	80 ± 10% cc/min	87	79
5	PMT	mV	179.4	137.0
6	NORM PMT	mV	-2.2	1.2
7	A ZERO	-20 To 150 MV	147.1	134.7
8	HPVS	400 - 900 V	660	660
9	RX CELL TEMP	50 ± 1 °C	50.1	49.9
10	BOX TEMP	AMBIENT ± 5 °C	29.2	31.7
11	PMT TEMP	7 ± 2 °C	6.8	6.8
12	MOLY TEMP	315 ± 5 °C	316.0	316.0
13	RX CELL PRESSURE	<10 in - Hg-A	4.5	4.3
14	SAMPLE PRESSURE	25 - 35 in - Hg-A	28.6	28.6
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	2500 ± 1000 mV	2628.0	2629.0
23	ELECTRICAL TEST	2000 ± 1000 mV	2666.0	2665.0
24	VOLTAGE TEST	+5 V +12 V +15 V -15 V	5.08 /11.99/ 15.27/ -15.16	5.25 /12.10/ 15.29/ -15.17
25	ZERO GAS NO/NOx	0.00/0.00 PPB	-2.1 / -7.9	0.0/ 0.0
26	SPAN GAS NO/NOx	400.00/400.00 PPB	403.0 / 402.8	400.0 / 402.8

หมายเหตุ

- ทำการเปลี่ยน Sintered Filter 3 ชิ้น, Spring 3 ชิ้น, O-ring 6 ชิ้น
- ทำการ Calibrate Multi-Point

(คุณธนาคม มหาธาจ)
ลงนามเจ้าหน้าที่ (Signature)

ต้องการข้อมูลเพิ่มเติมทางด้านเทคนิค กรุณาติดต่อ : คุณธนาคม มหาธาจ โทรศัพท์ : 0-2515-8987
เลขที่ 388 ถนนรัชดาภิเษก แขวงจันทรเกษม เขตจตุจักร กรุงเทพฯ 10900 โทรศัพท์ : 0-2515-8999 โทรสาร : 0-2515-8988 E-Mail : Info@kinetics.co.th

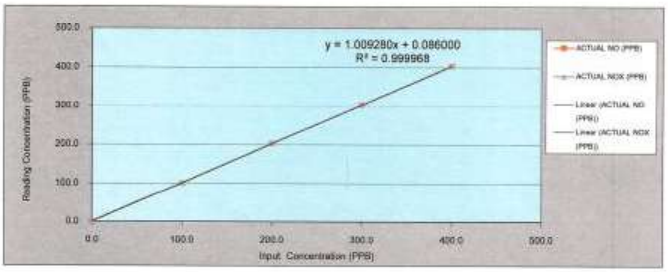
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MULTI POINT CALIBRATION REPORT

CUSTOMER NAME : SGS (Thailand) Co., Ltd.		
EQUIPMENT NAME : NO_x Analyzer		
MANUFACTURER : Teledyne - API	MODEL : T200	SERIAL NO : 7533
STANDARD GAS CONCENTRATION (PPM) : 53.40		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						
	IDEAL (PPB)	ACTUAL NO (PPB)	ERROR NO (PPB)	% ERROR NO	ACTUAL NO_x (PPB)	ERROR NO_x (PPB)	% ERROR NO_x
ZERO	0.0	0.0	0.0	0.0	0.0	0.1	0.0
1	100.0	100.6	0.6	0.6	100.3	0.3	0.3
2	200.0	202.1	-0.7	1.1	202.8	2.8	1.3
3	300.0	304.0	4.0	1.3	304.0	4.0	1.3
4	400.0	403.0	3.0	0.8	402.8	2.8	0.7
AVERAGE (%)				1.0			0.9



CALIBRATED BY : คุณธนาคม มหาธาจ DATE : 16 /02 /2566

ต้องการข้อมูลทางด้านเทคนิคเพิ่มเติม : คุณธนาคม มหาธาจ โทรศัพท์ : 02-515-8987

เลขที่ 388 ถนนรัชดาภิเษก แขวงจันทรเกษม เขตจตุจักร กรุงเทพฯ 10900 โทรศัพท์ : 0-2515-8999 โทรสาร : 0-2515-8988 E-Mail : Info@kinetics.co.th

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KINETICS

Environmental science business Unit

Customer service report

บริษัท เอส จี เอส (ประเทศไทย) จำกัด

Manufacturer	Equipment	Model
Teledyne API	NOx Analyzer	T200
S/N	Quotation	
7533	-	

● Checking Date ●

16/02/2567

● Problem

B2





contact us

● Correlation working / Remark

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

● Repair parts ●

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

Mr. Sujit

Technician / Engineer

KINETICS AAQM 2 2006

บริษัท ไคเนติคส์ คอร์ปอเรชั่น จำกัด

KINETICS CORPORATION LTD.

รายงานผลการซ่อมและปรับเทียบอุปกรณ์ตรวจวัดคุณภาพอากาศ

ลูกค้า / หน่วยงาน : SGS (Thailand) Co., Ltd. วันที่ : 16 กุมภาพันธ์ 2567

รายชื่ออุปกรณ์ / เครื่องมือ : NO_x Analyzer บริษัทผู้ผลิต : Teledyne API

รุ่นของอุปกรณ์ / เครื่องมือ : T200 หมายเลขอุปกรณ์ / เครื่องมือ : 7534

TEST VALUES				
	API MODEL T200		BEFORE	AFTER
1	RANGE	50 - 20,000 PPB	500.0	500.0
2	STABILITY	≤ 1 PPB	0.03	0.02
3	SAMPLE FLOW	500 ± 10% cc/min	479	472
4	OZONE FLOW	80 ± 10% cc/min	83	80
5	PMT	mV	23.1	51.2
6	NORM PMT	mV	-0.8	3.5
7	A ZERO	-20 To 150 MV	23.7	25.3
8	HPVS	400 - 900 V	650	650
9	RX CELL TEMP	50 ± 1 °C	50.0	50.0
10	BOX TEMP	AMBIENT ± 5 °C	32.4	29.8
11	PMT TEMP	7 ± 2 °C	7.0	7.0
12	MOLY TEMP	315 ± 5 °C	314.6	315.1
13	RX CELL PRESSURE	<10 in - Hg-A	4.5	4.5
14	SAMPLE PRESSURE	25 - 35 in - Hg-A	28.7	28.8
15	NOX SLOPE	1.0 ± 0.3	0.944	0.924
16	NOX OFFSET	-50 To 150	19.5	0.8
17	NO SLOPE	1.0 ± 0.3	0.907	0.907
18	NO OFFSET	-50 To 150	-0.70	-0.60
19	NO SAMPLE READING	PPB	-0.2	1.0
20	NO2 SAMPLE READING	PPB	1.0	12.7
21	NOX SAMPLE READING	PPB	0.8	13.8
22	OPTIC TEST	2000 ± 1000 mV	2627.0	2625.0
23	ELECTRICAL TEST	2000 ± 1000 mV	2470.0	2478.0
24	VOLTAGE TEST	+5 V +12 V +15 V -15 V	5.10 /11.89 /15.35 /-15.15	5.24 /12.01 /15.35 /-15.16
25	ZERO GAS NO/NOx	0.00/0.00 PPB	0.2 / -2.4	0.0 /0.0
26	SPAN GAS NO/NOx	400.00/400.00 PPB	397.6/ 400.1	397.6 /401.0

หมายเหตุ

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

(คุณธนาคม มหาอาจ)

ลงนามเจ้าหน้าที่ (Signature)

ต้องการข้อมูลเพิ่มเติมทางด้านเทคนิค กรุณาติดต่อ : คุณธนาคม มหาอาจ โทรศัพท์ : 0-2515-8987

เลขที่ 388 ถนนรัชดาภิเษก แขวงจันทรเกษม เขตจตุจักร กรุงเทพฯ 10900 โทรศัพท์ : 0-2515-8999 โทรสาร : 0-2515-8988 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 | SERIAL NO : 7534

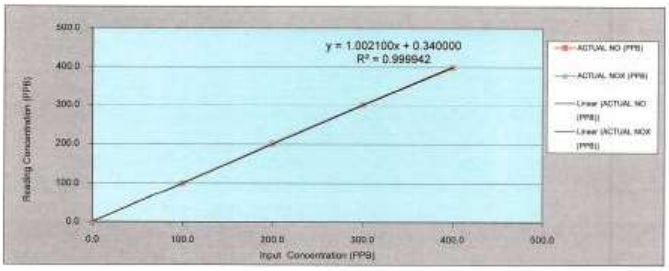
STANDARD GAS CONCENTRATION (PPM) : 53.4 | CYLINDER NO : CC745169

CYLINDER PRESSURE (psig) : 1500 | CERTIFIED DATE : Mar 10,2021

CERTIFIED BY : AIRGAS SPECIALTY GASES | EXPIRED DATE : Mar 10,2029

CALIBRATION RESULTS

POINT NO	CALIBRATION RESULTS						
	IDEAL (PPB)	ACTUAL NO (PPB)	ERROR NO (PPB)	% ERROR NO	ACTUAL NO_x (PPB)	ERROR NO_x (PPB)	% 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



CALIBRATED BY : คุณธนาคม มหาอาจ | DATE : 16 /02 /2567

ต้องการข้อมูลทางด้านเทคนิคเพิ่มเติม : คุณธนาคม มหาอาจ โทรศัพท์ : 02-515-8987

เลขที่ 388 ถนนรัชดาภิเษก แขวงจันทรเกษม เขตจตุจักร กรุงเทพฯ 10900 โทรศัพท์ : 0-2515-8999 โทรสาร : 0-2515-8988 E-Mail : Info@kinetics.co.th

KINETICS

Environmental science business unit

Customer service report

บริษัท เอส จี เอส (ประเทศไทย) จำกัด

Manufacturer	Equipment	Model
Teledyne API	NOx Analyzer	T200
S/N	Quotation	
7534	Q-B2-2024-036-SV	

● Checking Date ●

16/02/2567

● Problem

- พบปัญหา PMT Temp Warming ค่าติดลบ -2.5







B2



contact us

● Correlation working / Remark

1. PMT Temp Warming 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

Mr. Sujit

Technician / Engineer

KINETICS AAQM 2206

บริษัท ไคเนติคส์ คอร์ปอเรชั่น จำกัด

KINETICS CORPORATION LTD.

รายงานผลการซ่อมและปรับเทียบอุปกรณ์ตรวจวัดคุณภาพอากาศ

ลูกค้า / หน่วยงาน : SGS (Thailand) Co., Ltd. วันที่ : 16 กุมภาพันธ์ 2567

รายชื่ออุปกรณ์ / เครื่องมือ : NO_x Analyzer บริษัทผู้ผลิต : Teledyne API

รุ่นของอุปกรณ์ / เครื่องมือ : T200 หมายเลขอุปกรณ์ / เครื่องมือ : 7535

TEST VALUES				
	API MODEL T200		BEFORE	AFTER
1	RANGE	50 - 20,000 PPB	500.0	500.0
2	STABILITY	≤ 1 PPB	0.91	0.02
3	SAMPLE FLOW	500 ± 10% cc/min	464	488
4	OZONE FLOW	80 ± 10% cc/min	101	82
5	PMT	mV	163.4	53.2
6	NORM PMT	mV	23.7	20.6
7	A ZERO	-20 To 150 MV	145.8	54.6
8	HPVS	400 - 900 V	626	622
9	RX CELL TEMP	50 ± 1 °C	50.2	50.0
10	BOX TEMP	AMBIENT ± 5 °C	32.5	31.8
11	PMT TEMP	7 ± 2 °C	6.7	6.8
12	MOLY TEMP	315 ± 5 °C	316.0	316.0
13	RX CELL PRESSURE	<10 in - Hg-A	4.4	4.3
14	SAMPLE PRESSURE	25 - 35 in - Hg-A	28.5	28.5
15	NOX SLOPE	1.0 ± 0.3	1.024	0.988
16	NOX OFFSET	-50 To 150	21.4	-0.5
17	NO SLOPE	1.0 ± 0.3	0.983	0.958
18	NO OFFSET	-50 To 150	-0.7	-1.3
19	NO SAMPLE READING	PPB	9.6	0.3
20	NO2 SAMPLE READING	PPB	0.7	5.7
21	NOX SAMPLE READING	PPB	10.3	6.0
22	OPTIC TEST	2000 ± 1000 mV	1500.0	1510.0
23	ELECTRICAL TEST	2000 ± 1000 mV	2597.0	2594.0
24	VOLTAGE TEST	+5 V +12 V +15 V -15 V	5.25 / 12.18 /15.52 /-15.29	5.25 / 12.15 /15.50 /-15.20
25	ZERO GAS NO/NOx	0.00/0.00 PPB	-1.2 /-9.8	0.0 / 0.0
26	SPAN GAS NO/NOx	400.00/400.00 PPB	421.4 / 418.5	399.4 /401.2

หมายเหตุ

- ทำการเปลี่ยน Power Supply 12vdc ใหม่ เนื่องจากตัวเก่าเสียใช้งานไม่ได้
- ทำการเปลี่ยน Sintered Filter 3 ชิ้น, Spring 3 ชิ้น, O-ring 6 ชิ้น
- ทำการCalibrate Multi-point

(คุณธนาคม มหาอาจ)

ลงนามเจ้าหน้าที่ (Signature)

ต้องการข้อมูลเพิ่มเติมทางด้านเทคนิค กรุณาติดต่อ : คุณธนาคม มหาอาจ โทรศัพท์ : 0-2515-8987

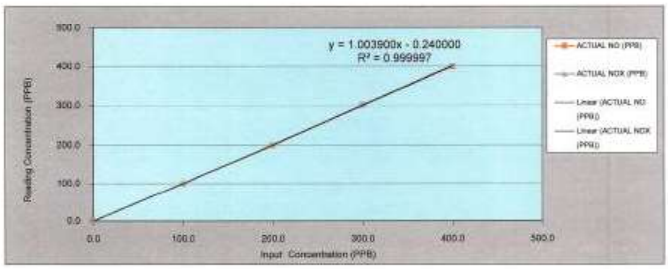
เลขที่ 388 ถนนรัชดาภิเษก แขวงจันทรเกษม เขตจตุจักร กรุงเทพฯ 10900 โทรศัพท์ : 0-2515-8999 โทรสาร : 0-2515-8988 E-Mail : Info@kinetics.co.th

MULTI POINT CALIBRATION REPORT

CUSTOMER NAME : SGS (Thailand) Co., Ltd.			
EQUIPMENT NAME : NO_x Analyzer			
MANUFACTURER : Teledyne - API	MODEL : T200	SERIAL NO : 7535	
STANDARD GAS CONCENTRATION (PPM) : 53.40		CYLINDER NO : CC745168	
CYLINDER PRESSURE (psig) : 1500		CERTIFIED DATE : Mar 10 ,2021	
CERTIFIED BY : AIRGAS SPECIALTY GASES		EXPIRED DATE : Mar 10 ,2029	

CALIBRATION RESULTS

POINT NO	CALIBRATION RESULTS						
	IDEAL (PPB)	ACTUAL NO (PPB)	ERROR NO (PPB)	% ERROR NO	ACTUAL NO_x (PPB)	ERROR NO_x (PPB)	% ERROR NO_x
ZERO	0.0	0.0	0.0	0.0	0.0	0.0	0.0
1	100.0	99.7	-0.3	-0.3	99.8	-0.20	-0.20
2	200.0	199.5	-0.5	-0.3	200.4	0.4	0.2
3	300.0	301.0	1.0	0.3	301.3	1.3	0.4
4	400.0	399.4	-0.6	-0.2	401.2	1.2	0.3
AVERAGE (%)				0.3			0.3



CALIBRATED BY : คุณธนากร มหาธาร	DATE : 16 /02 /2567

ต้องการข้อมูลทางด้านเทคนิคเพิ่มเติม : คุณธนากร มหาธาร โทรศัพท์ : 02-515-8987

เลขที่ 388 ถนนรัชดาภิเษก แขวงจันทรเกษม เขตจตุจักร กรุงเทพฯ 10900 โทรศัพท์ : 0-2515-8999 โทรสาร : 0-2515-8988 E-Mail : info@kinetics.co.th

KINETICS

Customer service report

บริษัท เอส จี เอส (ประเทศไทย) จำกัด

Manufacturer	Equipment	Model
Teledyne API	NOx Analyzer	T200
S/N	Quotation	
7535	Q-B2-2024-037-SV	

● Checking Date ●

16/02/2567

● Problem

- พบปัญหาไฟ 12vdc. เนื่องจากตัวเก่าใช้งานไม่ได้



B2

contact us

● Correlation 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

Mr. Sujit

Technician / Engineer

ENRS 074

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 : Vantage Pro 2 Model No. : 6152C

Mfg Code : Display AK130626036 Transmitter A111101P020

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

Calibration Condition : Temperature 25.1 °C Barometric Pressure 1008.6 hPa

NATIONAL STANDARD WIND TUNNEL : Wind Aloft 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 120629586)

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

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

: Thermoschneider No.9188 : testo. testo 645 Serial No. 02848057

STANDARD BAROMETER : Digital Barometer Vaisala Type PTB220 No. V1220015

Calibrated by : Watcharapol

Mr. Watcharapol Suhwat
Mechanical Engineer

Signed :

Mrs Pisaya Promsut

(Authorised Signatory)
for the Chief
Sub-Standard Instrument

THAI METEOROLOGICAL DEPARTMENT

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

The Result of Calibration

Certification No. 222/24

31 May, 2024 Page : 2 of 6

Standard	HOOK GAGE NO. 1425			TESTED ANEMOMETER	
Ultrasonic Anemometer	Pressure	Vacuum	Velocity	Velocity	Correction
m/sec	inches H2O	inches H2O	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	-	-	-	10.7	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 Aloft Plotting Board. US.DEPARTMENT OF COMMERCE WEATHER BUREAU	
WIND DIRETION	TESTED WIND DIRECTION
0	0
90	90
180	180
270	270

Calibrated by : Watcharapol

Mr. Watcharapol Suhwat
Mechanical Engineer

Calibration & Test Section
Meteorological Instruments Bureau

THAI METEOROLOGICAL DEPARTMENT
4353 Sukhumvit, Bangna, Bangkok 10260 Tel. 0-2396-0156,0-2399-0469

The Result of Calibration

Certification No. 222/24

31 May, 2024 Page : 3 of 6

Standard Barometer Pressure	Tested Barometer Pressure	Correction
753.68	754.8	-1.12
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	756.4	-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
	Average	-1.10

Calibrated by :
Mr. Watcharapol Subwat
Mechanical Engineer

Calibration & Test Section
Meteorological Instruments Bureau

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

The Result of Calibration

Certification No. 222/24

31 May, 2024 Page : 4 of 6

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

Calibrated by :
Mr. Watcharapol Subwat
Mechanical Engineer

Calibration & Test Section
Meteorological Instruments Bureau

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

The Result of Calibration

Certification No. 222/24

31 May, 2024 Page : 5 of 6

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

Calibrated by :
Mr. Watcharapol Subwat
Mechanical Engineer

Calibration & Test Section
Meteorological Instruments Bureau

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

Page: 6 of 6

ใบรับรอง

หนังสือฉบับนี้ขอรับรองว่า เครื่องวัดฝน ยี่ห้อ Davis Instruments แบบ TIPPING BUCKET Product No. 6152CUK Mfg. Code. A111101P020 ทำการสอบเทียบกับแก้วัดฝนแบบแก้วดวง GAUGE DIAMETER 8.0 INCHES, NEGRETTI & ZAMBRA LONDON No. 71082 และสามารถนำไปใช้ได้ มีค่าถูกต้องตามรายละเอียดของเครื่องมือ (0.2 mm./TIP)

ลงชื่อ.....

(นายวัชรพล ทรัพย์วัฒน์)

วิศวกรชำนาญการ

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 29 June, 2023 Certification No. 245/23

Page : 1 of 6

Object : Precision Weather Station

Manufacturer : Davis Instruments

Type : Vantage Pro 2 Model No. : 6152C

Mfg Code : Display AZ170619022 Transmitter AZ170619022

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

VERIFIED
BY: Misch DATE: 2uly, 2023

Calibration Condition : Temperature 25.1 °C Barometric Pressure 1008.7 hPa

NATIONAL STANDARD WIND TUNNEL : Thermal Anemometer 642 S/N 91563
: HOOK GAGE NO 1425 : Wind Aloft Plotting Board
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 120629586)
JAPAN QUALITY ASSURANCE ORGANIZATION : Standard Velocity at 0 - 20 m/sec
STANDARD THERMOMETER : Theodor Friedrich : Dry No.8390/94 Wet No. 8389/94
: Thermoschneider No.9186 : testo, testo 645 Series No. 02618021
STANDARD BAROMETER : Digital Barometer Vaisala Type PTB220 No. V1220015

Calibrated by : Watcharapol
Mr. Watcharapol Subwat
Mechanical Engineer

Signed :
Mr. Pirapod Promsut
(Authorized Signatory)
for the Chief
Sub-Standard Instrument

THAI METEOROLOGICAL DEPARTMENT

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

The Result of Calibration

Certification No. 245/23

29 June, 2023 Page : 2 of 6

Standard	HOOK GAGE NO. 1425			TESTED ANEMOMETER	
Ultrasonic Anemometer	Pressure	Vacuum	Velocity	Velocity	Correction
m/sec	inches H2O	inches H2O	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	-	-	-	10.7	0.31
13.01	-	-	-	13.0	0.01
15.01	-	-	-	14.7	0.31
17.02	-	-	-	17.0	0.02
20.02	-	-	-	19.3	0.72

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

Calibrated by : Watcharapol
Mr. Watcharapol Subwat
Mechanical Engineer

Calibration & Test Section
Meteorological Instruments Bureau

THAI METEOROLOGICAL DEPARTMENT

4353 Sukhumvit, Bangna, Bangkok 10260 Tel. 0-2396-0156,0-2399-0469

The Result of Calibration

Certification No. 245/23

29 June, 2023 Page : 3 of 6

Standard Barometer Pressure	Tested Barometer Pressure	Correction
759.94	761.3	-1.36
760.13	761.6	-1.47
760.67	762.1	-1.43
760.73	762.2	-1.47
757.28	758.6	-1.32
757.34	758.7	-1.36
757.52	759.0	-1.48
757.79	759.1	-1.31
758.10	759.4	-1.30
758.16	759.5	-1.34
758.66	760.0	-1.34
758.47	759.9	-1.43
758.56	760.0	-1.44
758.75	760.2	-1.45
758.98	760.4	-1.42
759.36	760.7	-1.34
756.54	757.9	-1.36
756.66	758.0	-1.34
757.00	758.4	-1.40
757.15	758.5	-1.35
	Average	-1.38

Calibrated by : Watcharapol
Mr. Watcharapol Subwat
Mechanical Engineer

Calibration & Test Section
Meteorological Instruments Bureau

THAI METEOROLOGICAL DEPARTMENT

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

The Result of Calibration

Certification No. 245/23

29 June, 2023 Page : 4 of 6

Standard	Temperature Sensor Reading	
Temp.	Reading	Correction
°C	°C	°C
45.5	45.5	0.0
30.2	30.1	0.1
15.2	15.4	-0.2

Calibrated by : Watcharapol
Mr. Watcharapol Subwat
Mechanical Engineer

Calibration & Test Section
Meteorological Instruments Bureau

THAI METEOROLOGICAL DEPARTMENT

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

The Result of Calibration

Certification No. 245/23

29 June, 2023 Page : 5 of 6

Standard Humidity % R.H.	Relative Humidity Sensor Reading	
	Reading % R.H.	Correction % R.H.
82.45	84	-1.55
63.55	63	0.55
46.32	45	1.32

Calibrated by : Watcharapol

Mr. Watcharapol Subwat

Mechanical Engineer

Calibration & Test Section

Meteorological Instruments Bureau

Date of Issue 29 June, 2023 Certification No. 245/23

Page : 6 of 6

ใบรับรอง

หนังสือฉบับนี้ขอรับรองว่า เครื่องวัดฝน ยี่ห้อ Davis Instruments แบบ TIPPING BUCKET Product No. 6152 C Mfg. Code. AZ170619022 ทำการสอบเทียบกับแก้วฝนแบบแก้วตวง GAUGE DIAMETER 8.0 INCHES , NEGRETTI & ZAMBRA LONDON No 71082 และสามารถนำไปใช้ได้ มีค่าถูกต้องตามรายละเอียดของเครื่องมือ (0.01 in/ TIP)

ลงชื่อ.....

(นายวัชรพล ทรัพย์วัฒน์)

วิศวกรชำนาญการ

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 29 June, 2023 Certification No. 246/23

Page : 1 of 6

Object : Precision Weather Station

Manufacturer : Davis Instruments

Type : Vantage Pro 2 Model No. : 6152C

Mfg Code : Display AZ170619028 Transmitter AZ170619028

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

VERIFIED BY DWisok DATE July 2023

Calibration Condition : Temperature 25.1 °C Barometric Pressure 1007.9 hPa

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

: HOOK GAGE NO 1425 : Wind Aloft Plotting Board

N.I.S.T. Test Reference Number 731/241480 : Standard Velocity at 20 - 30 m/sec

: Ultrasonic Anemometer Model DA-650-3TV (sensor TR-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. 8389/94

: Thermoschneider No.9188 : testo, testo 645 Serial No. 02810057

STANDARD BAROMETER : Digital Barometer Vaisala Type PTB220 No. V1220015

Calibrated by : Watcharapol

Mr. Watcharapol Subwat

Mechanical Engineer

Signed :

Mr. Pisarod Promsut

(Authorised Signatory)

for the Chief

Sub-Standard Instrument

THAI METEOROLOGICAL DEPARTMENT

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

The Result of Calibration

Certification No. 246/23

29 June, 2023 Page : 2 of 6

Standard Ultrasonic Anemometer m/sec	HOOK GAGE NO. 1425			TESTED ANEMOMETER	
	Pressure inches H2O	Vacumm inches H2O	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	-	-	-	15.1	-0.09
17.02	-	-	-	17.0	0.02
20.02	-	-	-	19.3	0.72

Wind Aloft Plotting Board.

US.DEPARTMENT OF COMMERCE WEATHER BUREAU

WIND DIRETION	TESTED WIND DIRECTION
0	0
90	90
180	180
270	270

Calibrated by : Watcharapol

Mr. Watcharapol Subwat

Mechanical Engineer

Calibration & Test Section

Meteorological Instruments Bureau

THAI METEOROLOGICAL DEPARTMENT
4353 Sukhumvit, Bangna, Bangkok 10260 Tel. 0-2396-0156,0-2399-0469

The Result of Calibration

Certification No. 246/23

29 June, 2023 Page : 3 of 6

Standard Barometer Pressure	Tested Barometer Pressure	Correction
759.94	761.1	-1.16
760.13	761.3	-1.17
760.67	761.8	-1.13
760.73	761.8	-1.07
757.28	758.2	-0.92
757.34	758.4	-1.06
757.52	758.6	-1.08
757.79	758.7	-0.91
758.10	759.1	-1.00
758.16	759.2	-1.04
758.66	759.7	-1.04
758.47	759.5	-1.03
758.58	759.6	-1.04
758.75	759.8	-1.05
758.98	760.1	-1.12
759.36	760.5	-1.14
756.54	757.6	-1.06
756.66	757.7	-1.04
757.00	758.1	-1.10
757.15	758.2	-1.05
	Average	-1.06

Calibrated by :

Mr. Watcharapol Subwat
Mechanical Engineer

Calibration & Test Section
Meteorological Instruments Bureau

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

The Result of Calibration

Certification No. 246/23

29 June, 2023 Page : 4 of 6

Standard Temp. °C	Temperature Sensor Reading	
	Reading °C	Correction °C
45.5	45.7	-0.2
30.2	30.3	-0.1
15.2	15.2	0.0

Calibrated by :

Mr. Watcharapol Subwat
Mechanical Engineer

Calibration & Test Section
Meteorological Instruments Bureau

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

The Result of Calibration

Certification No. 246/23

29 June, 2023 Page : 5 of 6

Standard Humidity % R.H.	Relative Humidity Sensor Reading	
	Reading % R.H.	Correction % R.H.
82.45	84	-1.55
63.55	64	-0.45
46.32	46	0.32

Calibrated by :

Mr. Watcharapol Subwat
Mechanical Engineer

Calibration & Test Section
Meteorological Instruments Bureau

Date of Issue 29 June, 2023

Certification No. 246/23

Page : 6 of 6

ใบรับรอง

หนังสือฉบับนี้ขอรับรองว่า เครื่องวัดฝน ยี่ห้อ Davis Instruments แบบ TIPPING BUCKET Product No. 6152 C Mfg. Code. AZ170619028 ทำการสอบเทียบกับแก้วฝนแบบแก้วตวง GAUGE DIAMETER 8.0 INCHES , NEGRETTI & ZAMBRA LONDON No 71082 และสามารถนำไปใช้ได้ มีค่าถูกต้องตามรายละเอียดของเครื่องมือ (0.01 in/ TIP)

ลงชื่อ.....

(นายวัชรพล ทรัพย์วัฒน์)
วิศวกรชำนาญการ

ENAE 17810

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. 076/24

Object : Precision Weather Station

Manufacturer : Davis Instruments

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

Mfg Code : Display AZ170619031 Transmitter BD190415074

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

Calibration Condition : Temperature 25.1 °C Barometric Pressure 1011.3 hPa

NATIONAL STANDARD WIND TUNNEL : Wind Aloft 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 120629586)
JAPAN QUALITY ASSURANCE ORGANIZATION : Standard Velocity at 0 - 20 m/sec
STANDARD THERMOMETER : Theodor Friedrich : Dry No.8390/94 Wet No. 8389/94
: Thermoschneider No.9188 : testo. testo 645 Serial No. 02848057
STANDARD BAROMETER : Digital Barometer Vaisala Type PTB220 No. V1220016

Calibrated by : Signed : (Authorised Signatory)

Mr. Watcharapol Subwat Mr. Pisood Promsut for the Chief

Mechanical Engineer Sub-Standard Instruments

THAI METEOROLOGICAL DEPARTMENT

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

The Result of Calibration

Certification No. 076/24

7 February, 2024

Standard	HOOK GAGE NO. 1425			TESTED ANEMOMETER	
Ultrasonic Anemometer	Pressure	Vacuum	Velocity	Velocity	Correction
m/sec	inches H2O	inches H2O	m/sec	m/sec	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 DIRETION	TESTED WIND DIRECTION
0	0
90	90
180	180
270	270

Calibrated by : Calibration & Test Section

Mr. Watcharapol Subwat Meteorological Instruments Bureau

Mechanical Engineer

THAI METEOROLOGICAL DEPARTMENT

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

The Result of Calibration

Certification No. 076/24

7 February, 2024

Standard Barometer Pressure	Tested Barometer Pressure	Correction
758.19	759.3	-1.11
758.01	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	-1.05
759.77	760.9	-1.13
760.20	761.3	-1.10
760.68	761.6	-0.92
761.30	763.1	-1.20
762.08	763.2	-1.12
761.96	763.0	-1.04
761.83	762.9	-1.07
758.69	759.8	-1.11
758.91	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
Average		-1.06

Calibrated by : Calibration & Test Section

Mr. Watcharapol Subwat Meteorological Instruments Bureau

Mechanical Engineer

THAI METEOROLOGICAL DEPARTMENT

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

The Result of Calibration

Certification No. 076/24

7 February, 2024

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

Calibrated by : Calibration & Test Section

Mr. Watcharapol Subwat Meteorological Instruments Bureau

Mechanical Engineer

THAI METEOROLOGICAL DEPARTMENT

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

The Result of Calibration

Certification No. 076/24

7 February, 2024 Page : 5 of 6

Standard Humidity % R.H.	Relative Humidity Sensor Reading	
	Reading % R.H.	Correction % R.H.
45.1	47	-1.90
65.5	66	-0.50
95.2	94	1.20

Calibrated by : Watcharapol

Mr. Watcharapol Subwat
Mechanical Engineer

Calibration & Test Section
Meteorological Instruments Bureau

Date of Issue 7 February, 2024 Certification No. 076/24

Page: 6 of 6

ใบรับรอง

หนังสือฉบับนี้ขอรับรองว่า เครื่องวัดฝน ยี่ห้อ Davis Instruments แบบ TIPPING BUCKET Product No. 6152C Mfg. Code. BD190415074 ทำการสอบเทียบกับแก้ววัดฝนแบบแก้วตวง GAUGE DIAMETER 8.0 INCHES, NEGRETTI & ZAMBRA LONDON No. 71082 และสามารถนำไปใช้ได้ มีค่าถูกต้องตามรายละเอียดของเครื่องมือ (0.01 in./TIP)

ลงชื่อ.....

(นายวัชรพล ทรัพย์วัฒน์)

วิศวกรชำนาญการ

ENAS 0118

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 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 Transmitter AZ170619045

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

VERIFIED
BY: DATE: May 19, 2023

Calibration Condition : Temperature 25.1 °C Barometric Pressure 1008.6 hPa

NATIONAL STANDARD WIND TUNNEL : Thermal Anemometer 642 S/N 91563
: HOOK GAGE NO 1425 : Wind Aloft Plotting Board
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 120629586)
JAPAN QUALITY ASSURANCE ORGANIZATION : Standard Velocity at 0 - 20 m/sec
STANDARD THERMOMETER : Theodor Friedrich : Dry No.8390/94 Wet No. 8389/94
: Thermoschneider No.9188 : testo, testo 645 Serial No. 42348067
STANDARD BAROMETER : Digital Barometer Vaisala Type PTB220 No. V1220015

Calibrated by : Watcharapol
Mr. Watcharapol Subwat
Mechanical Engineer

Signed :
Mr. Piyapol Promsut
(Authorized Signatory)
for the Chief
Sub-Standard Instrument

THAI METEOROLOGICAL DEPARTMENT

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

The Result of Calibration

Certification No. 182/23

16 May, 2023 Page : 2 of 6

Standard Ultrasonic Anemometer m/sec	HOOK GAGE NO. 1425 Pressure inches H2O	Vacuum inches H2O	Velocity m/sec	TESTED ANEMOMETER Velocity m/sec	Correction 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 Aloft Plotting Board.
US.DEPARTMENT OF COMMERCE WEATHER BUREAU

WIND DIRETION	TESTED WIND DIRECTION
0	0
90	90
180	180
270	270

Calibrated by : Watcharapol
Mr. Watcharapol Subwat
Mechanical Engineer

Calibration & Test Section
Meteorological Instruments Bureau

THAI METEOROLOGICAL DEPARTMENT
4353 Sukhumvit, Bangna, Bangkok 10260 Tel. 0-2396-0156,0-2399-0469

The Result of Calibration

Certification No. 182/23

16 May, 2023 Page : 3 of 6

Standard Barometer Pressure	Testort Barometer Pressure	Correction
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
757.98	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
756.26	756.4	-0.14
756.56	756.6	-0.04
757.32	757.4	-0.08
	Average	

Calibrated by :

Mr. Watcharapol Subwat
Mechanical Engineer

Calibration & Test Section
Meteorological Instruments Bureau

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

The Result of Calibration

Certification No. 182/23

16 May, 2023 Page : 4 of 6

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

Calibrated by :

Mr. Watcharapol Subwat
Mechanical Engineer

Calibration & Test Section
Meteorological Instruments Bureau

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

The Result of Calibration

Certification No. 182/23

16 May, 2023 Page : 5 of 6

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

Calibrated by :

Mr. Watcharapol Subwat
Mechanical Engineer

Calibration & Test Section
Meteorological Instruments Bureau

Date of Issue 16 May, 2023

Certification No. 182/23

Page : 6 of 6

ใบรับรอง

หนังสือฉบับนี้ขอรับรองว่า เครื่องวัดฝน ยี่ห้อ Davis Instruments แบบ TIPPING BUCKET Product No. 6152 C Mfg. Code. AZ170619045 ทำการสอบเทียบกับแก้วฝนแบบแก้วดวง GAUGE DIAMETER 8.0 INCHES , NEGRETTI & ZAMBRA LONDON No 71082 และสามารถนำไปใช้ได้ มีค่าถูกต้องตามรายละเอียดของเครื่องมือ (0.01 in/ TIP)

ลงชื่อ .....

(นายวัชรพล ทรัพย์วัฒน์)
วิศวกรชำนาญการ

EMA 1916

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. 072/24

Object : Precision Weather Station

Manufacturer : Davis Instruments

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

Mfg Code : Display AZ170619046 Transmitter AZ170619046

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

Calibration Condition : Temperature 25.1 °C Barometric Pressure 1012.5 hPa

NATIONAL STANDARD WIND TUNNEL : Wind Aloft 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 120629586)

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

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

: Thermoschneider No.9188 : testo. testo 645 Serial No. 02848057

STANDARD BAROMETER : Digital Barometer Vaisala Type PTB220 No. V1220015

Calibrated by : Watcharapol Signed : Mr. Pisoot Promsut (Authorised Signatory)

Mr. Watcharapol Subwat for the Chief

Mechanical Engineer Sub-Standard Instrument



THAI METEOROLOGICAL DEPARTMENT

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

The Result of Calibration

Certification No. 072/24

7 February, 2024

Standard	HOOK GAGE NO. 1425			TESTED ANEMOMETER	
Ultrasonic Anemometer	Pressure	Vacumm	Velocity	Velocity	Correction
m/sec	inches H2O	inches H2O	m/sec	m/sec	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	-	-	-	20.0	0.02

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

Calibrated by : Watcharapol

Mr. Watcharapol Subwat

Mechanical Engineer

Calibration & Test Section

Meteorological Instruments Bureau



THAI METEOROLOGICAL DEPARTMENT

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

The Result of Calibration

Certification No. 072/24

7 February, 2024

Standard Barometer Pressure	Tested Barometer Pressure	Correction
758.19	759.0	-0.81
758.01	758.8	-0.79
756.84	759.6	-0.76
759.19	759.8	-0.61
759.29	760.0	-0.71
759.25	760.2	-0.95
759.65	760.4	-0.75
759.77	760.6	-0.83
760.20	760.9	-0.70
760.68	761.3	-0.62
761.90	762.7	-0.80
762.06	762.8	-0.72
761.96	762.7	-0.74
761.83	762.4	-0.57
758.69	759.4	-0.71
758.91	759.6	-0.69
759.11	759.7	-0.59
759.67	760.2	-0.53
759.98	760.6	-0.62
760.18	760.8	-0.62
	Average	-0.70

Calibrated by : Watcharapol

Mr. Watcharapol Subwat

Mechanical Engineer

Calibration & Test Section

Meteorological Instruments Bureau



THAI METEOROLOGICAL DEPARTMENT

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

The Result of Calibration

Certification No. 072/24

7 February, 2024

Standard Temp °C	Temperature Sensor Reading	
	Reading °C	Correction °C
45.3	45.2	0.1
30.2	30.2	0.0
15.8	15.8	0.0

Calibrated by : Watcharapol

Mr. Watcharapol Subwat

Mechanical Engineer

Calibration & Test Section

Meteorological Instruments Bureau



THAI METEOROLOGICAL DEPARTMENT

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

The Result of Calibration

Certification No. 072/24

7 February, 2024 Page : 5 of 6

Standard Humidity % R.H.	Relative Humidity Sensor Reading	
	Reading % R.H.	Correction % R.H.
45.1	44	1.10
66.5	67	-1.50
95.2	98	-2.80

Calibrated by : Watcharapol

Mr. Watcharapol Subwat
Mechanical Engineer

Calibration & Test Section
Meteorological Instruments Bureau

Date of Issue 7 February, 2024 Certification No. 072/24

Page: 6 of 6

ใบรับรอง

หนังสือฉบับนี้ขอรับรองว่า เครื่องวัดฝน ยี่ห้อ Davis Instruments แบบ TIPPING BUCKET Product No. 6152C Mfg. Code. AZ170619046 ทำการสอบเทียบกับแก้วัดฝนแบบแก้วตวง GAUGE DIAMETER 8.0 INCHES, NEGRETTI & ZAMBRA LONDON No. 71082 และสามารถนำไปใช้ได้ มีค่าถูกต้องตามรายละเอียดของเครื่องมือ (0.01 in./TIP)

ลงชื่อ.....

(นายวัชรพล ทรัพย์วัฒน์)

วิศวกรชำนาญการ

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 Nanglinchee Road, Chongnonsi,
Yannawa, Bangkok 10120.

VERIFIED BY DMisesh DATE Aug 15, 2023

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 Aloft Plotting Board
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 120629686)
JAPAN QUALITY ASSURANCE ORGANIZATION : Standard Velocity at 0 - 20 m/sec
STANDARD THERMOMETER : Theodor Friedrich : Dry No.8390/94 Wet No. 8389/94
: Thermoschneider No.9188 : testo, testo 645 Serial No. 02348057
STANDARD BAROMETER : Digital Barometer Vaisala Type PTB220 No. U1220015

Calibrated by : Watcharapol
Mr. Watcharapol Subwat
Mechanical Engineer

Signed :
Mr. Pisood Promsut
(Authorised Signatory)
for the Chief
Sub-Standard Instrument

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 : 2 of 6

Standard Ultrasonic Anemometer m/sec	HOOK GAGE NO. 1425			TESTED ANEMOMETER	
	Pressure inches H2O	Vacumm inches H2O	Velocity m/sec	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 Aloft Plotting Board. US.DEPARTMENT OF COMMERCE WEATHER BUREAU	
WIND DIRETION	TESTED WIND DIRECTION
0	0
90	90
180	180
270	270

Calibrated by : Watcharapol
Mr. Watcharapol Subwat
Mechanical Engineer

Calibration & Test Section
Meteorological Instruments Bureau

THAI METEOROLOGICAL DEPARTMENT

4353 Sukhumvit, Bangna, Bangkok 10260 Tel. 0-2396-0156,0-2399-0469

The Result of Calibration

Certification No. 276/23

8 August, 2023 Page : 3 of 6

Standard Barometer Pressure	Tested Barometer Pressure	Correction
760.10	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
758.48	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
756.68	757.5	-0.82
756.35	757.2	-0.85
755.97	756.9	-0.93
758.97	759.8	-0.83
758.80	759.7	-0.90
758.63	759.5	-0.87

Average

Calibrated by :

Mr. Watcharapol Subwat

Mechanical Engineer

Calibration & Test Section

Meteorological Instruments Bureau

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	
	Reading °C	Correction °C
45.5	45.7	-0.2
30.2	30.3	-0.1
15.8	15.8	0.0

Calibrated by :

Mr. Watcharapol Subwat

Mechanical Engineer

Calibration & Test Section

Meteorological Instruments Bureau

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	
	Reading % R.H.	Correction % R.H.
85.52	86	-0.48
65.15	65	0.15
45.66	46	-0.34

Calibrated by :

Mr. Watcharapol Subwat

Mechanical Engineer

Calibration & Test Section

Meteorological Instruments Bureau

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 ทำการสอบเทียบกับแก้ววัดฝนแบบแก้วตวง GAUGE DIAMETER 8.0 INCHES, NEGRETTI & ZAMBRA LONDON No. 71082 และสามารถนำไปใช้ได้ มีค่าถูกต้องตามรายละเอียดของเครื่องมือ (0.01 in/TIP)

ลงชื่อ .....

(นายวัชรพล ทรัพย์วัลย์)

วิศวกรชำนาญการ

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 29 June, 2023 Certification No. 248/23

Object : Precision Weather Station

Manufacturer : Davis Instruments

Type : Vantage Pro 2 Model No. : 6152C

Mfg Code : Display BD190415078 Transmitter BD190415078

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

VERIFIED
BY JJW DATE Jul 09, 2023

Calibration Condition : Temperature 25.1 °C Barometric Pressure 1007.1 hPa

NATIONAL STANDARD WIND TUNNEL : Thermal Anemometer 642 S/N 91563
: HOOK GAGE NO 1425 : Wind Aloft Plotting Board
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 120629586)
JAPAN QUALITY ASSURANCE ORGANIZATION : Standard Velocity at 0 - 20 m/sec
STANDARD THERMOMETER : Theodor Friedrich : Dry No.8390/94 Wet No. 8389/94
: Thermoschneider No.9188 : testo, testo 645 Serial No. 02849057
STANDARD BAROMETER : Digital Barometer Vaisala Type PTB220 No. V1220015

Calibrated by : Signed :
Mr. Watcharapol Subwat Mr. Pisood Promsut
Mechanical Engineer (Authorised Signatory)
for the Chief
Sub-Standard Instrument

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

The Result of Calibration

Certification No. 248/23

29 June, 2023

Standard	HOOK GAGE NO. 1425			TESTED ANEMOMETER	
Ultrasonic Anemometer	Pressure	Vacumm	Velocity	Velocity	Correction
m/sec	inches H2O	inches H2O	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	-	-	-	10.7	0.31
13.01	-	-	-	13.0	0.01
15.01	-	-	-	14.7	0.31
17.02	-	-	-	17.0	0.02
20.02	-	-	-	19.3	0.72

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

Calibrated by :
Mr. Watcharapol Subwat
Mechanical Engineer
Calibration & Test Section
Meteorological Instruments Bureau

THAI METEOROLOGICAL DEPARTMENT
4353 Sukhumvit, Bangna, Bangkok 10260 Tel. 0-2396-0156,0-2399-0469

The Result of Calibration

Certification No. 248/23

29 June, 2023

Standard Barometer Pressure	Tested Barometer Pressure	Correction
759.94	761.0	-1.06
760.13	761.3	-1.17
760.67	761.7	-1.03
760.73	761.8	-1.07
757.28	758.2	-0.92
757.34	758.4	-1.06
757.52	758.6	-1.08
757.79	758.8	-1.01
758.10	759.2	-1.10
758.16	759.4	-1.24
758.66	759.8	-1.14
758.47	759.5	-1.03
758.56	759.6	-1.04
758.75	759.8	-1.05
758.98	760.1	-1.12
758.36	760.4	-1.04
756.54	757.5	-0.96
756.66	757.8	-1.14
757.00	758.1	-1.10
757.15	758.3	-1.15
Average		-1.07

Calibrated by :
Mr. Watcharapol Subwat
Mechanical Engineer
Calibration & Test Section
Meteorological Instruments Bureau

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

The Result of Calibration

Certification No. 248/23

29 June, 2023

Standard	Temperature Sensor Reading	
Temp.	Reading	Correction
°C	°C	°C
45.5	45.7	-0.2
30.2	30.1	0.1
15.2	15.3	-0.1

Calibrated by :
Mr. Watcharapol Subwat
Mechanical Engineer
Calibration & Test Section
Meteorological Instruments Bureau

THAI METEOROLOGICAL DEPARTMENT

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

The Result of Calibration

Certification No. 248/23

29 June, 2023 Page : 5 of 6

Standard Humidity % R.H.	Relative Humidity Sensor Reading	
	Reading % R.H.	Correction % R.H.
82.45	84	-1.55
63.55	64	-0.45
46.32	46	0.32

Calibrated by :

Mr. Watcharapol Subwat

Mechanical Engineer

Calibration & Test Section

Meteorological Instruments Bureau

Date of Issue 29 June, 2023 Certification No. 248/23

Page : 6 of 6

ใบรับรอง

หนังสือฉบับนี้ขอรับรองว่า เครื่องวัดฝน ยี่ห้อ Davis Instruments แบบ TIPPING BUCKET Product No. 6152 C Mfg. Code. BD190415078 ทำการสอบเทียบกับแก้วฝนแบบแก้วตวง GAUGE DIAMETER 8.0 INCHES , NEGRETTI & ZAMBRA LONDON No 71082 และสามารถนำไปใช้ได้ มีค่าถูกต้องตามรายละเอียดของเครื่องมือ (0.01 in / TIP)

ลงชื่อ.....

(นายวัชรพล ทรัพย์วัลย์)

วิศวกรชำนาญการ

ENAB-W137

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 29 June, 2023 Certification No. 248/23

Page : 1 of 6

Object : Precision Weather Station

Manufacturer : Davis Instruments

Type : Vantage Pro 2 Model No. : 6152C

Mfg Code : Display BD190415078 Transmitter BD190415078

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

VERIFIED
BY BWisek DATE Jul 09, 2023

Calibration Condition : Temperature 25.1 °C Barometric Pressure 1007.1 hPa

NATIONAL STANDARD WIND TUNNEL : Thermal Anemometer 642 S/N 91563
: HOOK GAGE NO 1425 : Wind Aloft Plotting Board
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 120629586)
JAPAN QUALITY ASSURANCE ORGANIZATION : Standard Velocity at 0 - 20 m/sec
STANDARD THERMOMETER : Theodor Friedrich : Dry No.8390/94 Wet No. 8389/94
: Thermoschneider No.9188 : testo, testo 645 Serial No. 02889057
STANDARD BAROMETER : Digital Barometer Vaisala Type PTB220 No. V1220015

Calibrated by :

Mr. Watcharapol Subwat

Mechanical Engineer

Signed :

Mr. Pisood Promsut

(Authorised Signatory)

for the Chief

Sub-Standard Instrument

THAI METEOROLOGICAL DEPARTMENT

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

The Result of Calibration

Certification No. 248/23

29 June, 2023 Page : 2 of 6

Standard	HOOK GAGE NO. 1425			TESTED ANEMOMETER	
Ultrasonic Anemometer m/sec	Pressure inches H2O	Vacuum inches H2O	Velocity m/sec	Velocity m/sec	Correction 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	-	-	-	10.7	0.31
13.01	-	-	-	13.0	0.01
15.01	-	-	-	14.7	0.31
17.02	-	-	-	17.0	0.02
20.02	-	-	-	19.3	0.72

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

Calibrated by :

Mr. Watcharapol Subwat

Mechanical Engineer

Calibration & Test Section

Meteorological Instruments Bureau

THAI METEOROLOGICAL DEPARTMENT
4353 Sukhumvit, Bangna, Bangkok 10260 Tel. 0-2396-0156,0-2399-0469

The Result of Calibration

Certification No. 248/23

29 June, 2023 Page : 3 of 6

Standard Barometer Pressure	Tested Barometer Pressure	Correction
759.94	761.0	-1.06
760.13	761.3	-1.17
760.67	761.7	-1.03
760.73	761.8	-1.07
757.28	758.2	-0.92
757.34	758.4	-1.06
757.52	758.6	-1.08
757.79	758.8	-1.01
758.10	759.2	-1.10
758.16	759.4	-1.24
758.66	759.8	-1.14
758.47	759.5	-1.03
758.56	759.6	-1.04
758.75	759.8	-1.05
758.98	760.1	-1.12
759.36	760.4	-1.04
756.54	757.5	-0.96
756.66	757.8	-1.14
757.00	758.1	-1.10
757.15	758.3	-1.15
	Average	-1.07

Calibrated by :
Mr. Watcharapol Subwat
Mechanical Engineer

Calibration & Test Section
Meteorological Instruments Bureau

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

The Result of Calibration

Certification No. 248/23

29 June, 2023 Page : 4 of 6

Standard Temp. °C	Temperature Sensor Reading	
	Reading °C	Correction °C
45.5	45.7	-0.2
30.2	30.1	0.1
15.2	15.3	-0.1

Calibrated by :
Mr. Watcharapol Subwat
Mechanical Engineer

Calibration & Test Section
Meteorological Instruments Bureau

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

The Result of Calibration

Certification No. 248/23

29 June, 2023 Page : 5 of 6

Standard Humidity % R.H.	Relative Humidity Sensor Reading	
	Reading % R.H.	Correction % R.H.
82.45	84	-1.55
63.55	64	-0.45
46.32	46	0.32

Calibrated by :
Mr. Watcharapol Subwat
Mechanical Engineer

Calibration & Test Section
Meteorological Instruments Bureau

Date of Issue 29 June, 2023 Certification No. 248/23

Page : 6 of 6

ใบรับรอง

หนังสือฉบับนี้ขอรับรองว่า เครื่องวัดฝน ยี่ห้อ Davis Instruments แบบ TIPPING BUCKET Product No. 6152 C Mfg. Code. BD190415078 ทำการสอบเทียบกับแก้วฝนแบบแก้วตวง GAUGE DIAMETER 8.0 INCHES , NEGRETTI & ZAMBRA LONDON No 71082 และสามารถนำไปใช้ได้ มีค่าถูกต้องตามรายละเอียดของเครื่องมือ (0.01 in / TIP)

ลงชื่อ .....

(นายวัชรพล ทรัพย์วัลย์)

วิศวกรชำนาญการ

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. 275/23

Object : Precision Weather Station

Manufacturer : Davis Instruments

Type : Vantage Pro 2 Model No. : 6152C

Mfg Code : Display BD190415079 Transmitter BD190415079

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

VERIFIED BY [illegible] DATE Aug 15,2023

Calibration Condition : Temperature 25.1 °C Barometric Pressure 1007.9 hPa

NATIONAL STANDARD WIND TUNNEL : Thermal Anemometer 642 S/N 91563
: HOOK GAGE NO 1425 : Wind Aloft Plotting Board
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 120629586)
JAPAN QUALITY ASSURANCE ORGANIZATION : Standard Velocity at 0 - 20 m/sec
STANDARD THERMOMETER : Theodor Friedrich : Dry No.8390/94 Wet No. 8389/94
: Thermoschneider No.9188 : testo, testo 645 Serial No. 02848057
STANDARD BAROMETER : Digital Barometer Vaisala Type PTB220 No. U2230015

Calibrated by : Watcharapol
Mr. Watcharapol Subwat
Mechanical Engineer

Signed : [illegible]
Mr. Pisool Rattanut
(Authorised Signatory)
for the Chief
Sub-Standard Instrument

Calibration & Test Section
Meteorological Instruments Bureau

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

The Result of Calibration

Certification No. 275/23

8 August, 2023

Standard	HOOK GAGE NO. 1425			TESTED ANEMOMETER	
Ultrasonic Anemometer	Pressure	Vacuum	Velocity	Velocity	Correction
m/sec	inches H2O	inches H2O	m/sec	m/sec	m/sec
1.00	-	-	-	0.9	0.10
3.02	-	-	-	3.0	0.02
5.00	-	-	-	5.0	0.00
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	-	-	-	15.1	-0.09
17.02	-	-	-	17.0	0.02
20.02	-	-	-	19.3	0.72

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

Calibrated by : Watcharapol
Mr. Watcharapol Subwat
Mechanical Engineer

Calibration & Test Section
Meteorological Instruments Bureau

THAI METEOROLOGICAL DEPARTMENT
4353 Sukhumvit, Bangna, Bangkok 10260 Tel. 0-2396-0156,0-2399-0469

The Result of Calibration

Certification No. 275/23

8 August, 2023

Standard Barometer Pressure	Tested Barometer Pressure	Correction
760.10	760.3	-0.20
760.13	760.4	-0.27
759.80	759.9	-0.10
759.48	759.6	-0.12
759.36	759.5	-0.14
759.20	759.3	-0.10
759.00	759.1	-0.10
758.68	758.8	-0.14
758.48	758.6	-0.12
758.32	758.5	-0.18
758.07	758.2	-0.13
757.91	758.0	-0.09
757.77	757.9	-0.13
757.40	757.5	-0.10
756.68	756.8	-0.12
756.35	756.5	-0.15
755.97	756.1	-0.13
758.97	759.0	-0.03
758.80	758.9	-0.10
758.63	758.8	-0.17
	Average	

Calibrated by : Watcharapol
Mr. Watcharapol Subwat
Mechanical Engineer

Calibration & Test Section
Meteorological Instruments Bureau

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

The Result of Calibration

Certification No. 275/23

8 August, 2023

Standard	Temperature Sensor Reading	
Temp.	Reading	Correction
°C	°C	°C
45.8	45.6	-0.1
30.2	30.3	-0.1
15.8	15.8	0.0

Calibrated by : Watcharapol
Mr. Watcharapol Subwat
Mechanical Engineer

Calibration & Test Section
Meteorological Instruments Bureau

THAI METEOROLOGICAL DEPARTMENT

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

The Result of Calibration

Certification No. 275/23

8 August, 2023 Page : 5 of 6

Standard Humidity % R.H.	Relative Humidity Sensor Reading	
	Reading % R.H.	Correction % R.H.
85.52	87	-1.48
65.15	66	-0.85
45.66	45	0.66

Calibrated by : Watcharapol Subwat
Mr. Watcharapol Subwat
Mechanical Engineer

Calibration & Test Section
Meteorological Instruments Bureau

Date of Issue 8 August, 2023 Certification No. 275/23

Page: 6 of 6

ใบรับรอง

หนังสือฉบับนี้ขอรับรองว่า เครื่องวัดฝน ยี่ห้อ Davis Instruments แบบ TIPPING BUCKET Product No. 6152C Mfg. Code. BD190415079 ทำการสอบเทียบกับแก้ววัดฝนแบบแก้วตวง GAUGE DIAMETER 8.0 INCHES, NEGRETTI & ZAMBRA LONDON No. 71082 และสามารถนำไปใช้ได้ มีค่าถูกต้องตามรายละเอียดของเครื่องมือ (0.01 in/TIP)

ลงชื่อ.....

(นายวัชรพล ทรัพย์วัลย์)

วิศวกรชำนาญการ

INFO 10190

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. 074/24

Page : 1 of 6

Object : Precision Weather Station

Manufacturer : Davis Instruments

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

Mfg Code : Display BD190415090 Transmitter BD190415090

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

Calibration Condition : Temperature 25.1 °C Barometric Pressure 1011.9 hPa

NATIONAL STANDARD WIND TUNNEL : Wind Aloft 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 120629586)
JAPAN QUALITY ASSURANCE ORGANIZATION : Standard Velocity at 0 - 20 m/sec
STANDARD THERMOMETER : Theodor Friedrich : Dry No.8390/94 Wet No. 8389/94
: Thermoschneider No.9188 : testo, testo 645 Serial No. 00648057
STANDARD BAROMETER : Digital Barometer Vaisala Type PTB220 No. V1230015

Calibrated by : Watcharapol Subwat
Mr. Watcharapol Subwat
Mechanical Engineer

Signed : Pisood Promsut
Mr. Pisood Promsut
(Authorised Signatory)
for the Chief
Sub-Standard Instrument

THAI METEOROLOGICAL DEPARTMENT

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

The Result of Calibration

Certification No. 074/24

7 February, 2024 Page : 2 of 6

Standard Ultrasonic Anemometer m/sec	HOOK GAGE NO. 1425			TESTED ANEMOMETER	
	Pressure inches H2O	Vacumm inches H2O	Velocity m/sec	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	-	-	-	11.0	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 Aloft Plotting Board. US.DEPARTMENT OF COMMERCE WEATHER BUREAU	
WIND DIRETION	TESTED WIND DIRECTION
0	0
90	90
180	180
270	270

Calibrated by : Watcharapol Subwat
Mr. Watcharapol Subwat
Mechanical Engineer

Calibration & Test Section
Meteorological Instruments Bureau

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

The Result of Calibration

Certification No. 074/24

7 February, 2024 Page : 3 of 6

Standard Barometer Pressure	Tested Barometer Pressure	Correction
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	-1.45
759.65	760.8	-1.15
759.77	760.9	-1.13
760.20	761.4	-1.20
760.68	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
758.91	760.1	-1.19
759.11	760.3	-1.19
759.67	760.9	-1.23
759.98	761.2	-1.22
760.18	761.4	-1.22
	Average	-1.24

Calibrated by :
Mr. Watcharapol Subwat
Mechanical Engineer

Calibration & Test Section
Meteorological Instruments Bureau

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

The Result of Calibration

Certification No. 074/24

7 February, 2024 Page : 4 of 6

Standard Temp. °C	Temperature Sensor Reading	
	Reading °C	Correction °C
45.3	45.2	0.1
30.2	30.2	0.0
15.8	15.9	-0.1

Calibrated by :
Mr. Watcharapol Subwat
Mechanical Engineer

Calibration & Test Section
Meteorological Instruments Bureau

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

The Result of Calibration

Certification No. 074/24

7 February, 2024 Page : 5 of 6

Standard Humidity % R.H.	Relative Humidity Sensor Reading	
	Reading % R.H.	Correction % R.H.
45.1	45	0.10
65.5	67	-1.50
95.2	98	-2.80

Calibrated by :
Mr. Watcharapol Subwat
Mechanical Engineer

Calibration & Test Section
Meteorological Instruments Bureau

Date of Issue 7 February, 2024 Certification No. 074/24

Page: 6 of 6

ใบรับรอง

หนังสือฉบับนี้ขอรับรองว่า เครื่องวัดฝน ยี่ห้อ Davis Instruments แบบ TIPPING BUCKET Product No. 6152C Mfg. Code. BD190415090 ทำการสอบเทียบกับแก้ววัดฝนแบบแก้วตวง GAUGE DIAMETER 8.0 INCHES, NEGRETTI & ZAMBRA LONDON No. 71082 และสามารถนำไปใช้ได้ มีค่าถูกต้องตามรายละเอียดของเครื่องมือ (0.01 in./TIP)

ลงชื่อ.....

(นายวัชรพล ทรัพย์วัฒน์)

วิศวกรชำนาญการ

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. 073/24

Object : Precision Weather Station

Manufacturer : Davis Instruments

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

Mfg Code : Display BD190415091 Transmitter BD190415091

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

Calibration Condition : Temperature 25.1 °C Barometric Pressure 1012.2 hPa

NATIONAL STANDARD WIND TUNNEL : Wind Aloft 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 120629586)

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

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

: Thermoschneider No.9188 : testo, testo 645 Serial No. 02848057

STANDARD BAROMETER : Digital Barometer Vaisala Type PTB220 No. Y1220015

Calibrated by : Watcharapol
Mr. Watcharapol Subwat
Mechanical Engineer

Signed : Pisoot Promsut
Mr. Pisoot Promsut
(Authorised Signatory)
for the Chief
Sub-Standard Instrument

THAI METEOROLOGICAL DEPARTMENT

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

The Result of Calibration

Certification No. 073/24

7 February, 2024

Standard	HOOK GAGE NO. 1425			TESTED ANEMOMETER	
Ultrasonic Anemometer	Pressure	Vacuum	Velocity	Velocity	Correction
m/sec	inches H2O	inches H2O	m/sec	m/sec	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. US.DEPARTMENT OF COMMERCE WEATHER BUREAU	
WIND DIRETION	TESTED WIND DIRECTION
0	0
90	90
180	180
270	270

Calibrated by : Watcharapol
Mr. Watcharapol Subwat
Mechanical Engineer

Calibration & Test Section
Meteorological Instruments Bureau

THAI METEOROLOGICAL DEPARTMENT

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

The Result of Calibration

Certification No. 073/24

7 February, 2024

Standard Barometer Pressure	Tested Barometer Pressure	Correction
758.19	761.4	-3.21
758.01	761.2	-3.19
758.84	762.0	-3.16
759.19	762.2	-3.01
759.29	762.3	-3.01
759.25	762.3	-3.05
759.65	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
759.67	762.6	-2.93
759.98	763.0	-3.02
760.18	763.0	-2.82
	Average	-3.01

Calibrated by : Watcharapol
Mr. Watcharapol Subwat
Mechanical Engineer

Calibration & Test Section
Meteorological Instruments Bureau

THAI METEOROLOGICAL DEPARTMENT

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

The Result of Calibration

Certification No. 073/24

7 February, 2024

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

Calibrated by : Watcharapol
Mr. Watcharapol Subwat
Mechanical Engineer

Calibration & Test Section
Meteorological Instruments Bureau

THAI METEOROLOGICAL DEPARTMENT

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

The Result of Calibration

Certification No. 073/24

7 February, 2024

Page : 5 of 6

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

Calibrated by : Watcharapol

Mr. Watcharapol Subwat

Mechanical Engineer

Calibration & Test Section

Meteorological Instruments Bureau

Date of Issue 7 February, 2024

Certification No. 073/24

Page: 6 of 6

ใบรับรอง

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

ลงชื่อ.....

(นายวัชรพล ทรัพย์วัฒน์)

วิศวกรชำนาญการ

ENSL 19175

INNOVATIVE INSTRUMENT CALIBRATION LAB
INNOVATIVE INSTRUMENT CO., LTD. HEAD OFFICE
7/139 MOO 13, SOI SUNTINAKORN 11 TAMBON BANG KAEO,
AMPHOE BANG PHLI SAMUT PRAKAN PROVINCE 10540 THAILAND
TEL : 0660-2116-5860-1 FAX: 0660-2116-7140

ACCREDITED AC 2062

Certificate of Calibration

Customer

Name : SGS (Thailand) Limited.

Address : 100 Nanglinchee Road, Chongnonsi, Yannawa 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

VERIFIED BY ... DATE Sep 20, 2023

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

Traceability : This certificate providoes 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 %.

Calibrated By : Mr. Noppadon Luangart, Service Calibration Engineer

Approved By : Mr. Pacit Mathavorn, Calibration Engineer Supervisor

Issue Date : 18 September 2023

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.

INNOVATIVE INSTRUMENT CALIBRATION LAB
INNOVATIVE INSTRUMENT CO., LTD. HEAD OFFICE
7/139 MOO 13, SOI SUNTINAKORN 11 TAMBON BANG KAEO,
AMPHOE BANG PHLI SAMUT PRAKAN PROVINCE 10540 THAILAND
TEL : 0660-2116-5860-1 FAX: 0660-2116-7140

ACCREDITED AC 2062

Certificate No : 23-ACT-138

Request No : Req-2023-1892

Sound pressure level — **Calibration Results :** Without Adjustment

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 Measured (%)	Adjustment Measured (%)	Uncertainty (± %)	Acceptance limit Class 1 (± %)
94 dB / 1000 Hz	0.07	-	0.40	2.5

Note :

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

End of Calibration

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.

INNOVATIVE INSTRUMENT CALIBRATION LAB
INNOVATIVE INSTRUMENT CO., LTD. HEAD OFFICE
7 139 MOO 13, SOI SUNTINAKORN 11 TAMBON BANG KAEO,
AMPHOE BANG PHLI SAMUT PRAKAN PROVINCE 10540 THAILAND
TEL : 66(0)-2116-5960-1 FAX: 66(0)-2116-7140

Certificate of Calibration

Customer

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

Certificate No : 24-ACT-100
Request No : Req-2024-1408

Unit Under Calibration Details

Measurement item : Acoustic Calibrator
Manufacturer : CIRRUS
Model : CR:515
Serial Number : 88373
ID : ENSL 19176

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 : 24 June 2024
Calibration Date : 4 July 2024
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	EEI	12 June 2025
THD Multimeter	2015	1047765	NIMT	16 January 2025

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 %.

Calibrated By :
Mr. Noppadon Luangart
Service Calibration Engineer

Approved By :
Mr. Pacit Mathavorn
Calibration Engineer Supervisor

Issue Date : 4 July 2024

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.

INNOVATIVE INSTRUMENT CALIBRATION LAB
INNOVATIVE INSTRUMENT CO., LTD. HEAD OFFICE
7 139 MOO 13, SOI SUNTINAKORN 11 TAMBON BANG KAEO,
AMPHOE BANG PHLI SAMUT PRAKAN PROVINCE 10540 THAILAND
TEL : 66(0)-2116-5960-1 FAX: 66(0)-2116-7140

Certificate No : 24-ACT-100
Request No : Req-2024-1408

Sound pressure level

Calibration Results : Without Adjustment

Calibration Range (dB)	Without Adjustment (dB)		Adjustment (dB)		Uncertainty (± dB)	Acceptance limit Class 1 (± dB)	Result
	Measured	Deviated value	Measured	Deviated value			
94 dB / 1000 Hz	93.79	-0.21	-	-	0.13	0.25	Pass

Frequency of Sound pressure level

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

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

Calibration Range (Hz)	Without Adjustment	Adjustment	Uncertainty (± %)	Acceptance limit Class 1 (± %)	Result
	Mensured (%)	Measured (%)			
94 dB / 1000 Hz	0.11	-	0.40	2.5	Pass

Note :

Function	Maximum-permitted Uncertainty of measurement
Sound pressure level	0.15 dB
Frequency	0.20%
Total distortion+noise	0.50%

* Acceptance limit was IEC60942:2017 Class 1

- The calibration results exclude the calibrator pressure correction
- The calibration results exclude the microphone volume correction

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FM-708-ACT-02 Rev.03 Issue date 5/6/24

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TEL : 66(0)-2116-5960-1 FAX: 66(0)-2116-7140

Certificate No : 24-ACT-100
Request No : Req-2024-1408

Decision Rule for Statements of Conformity

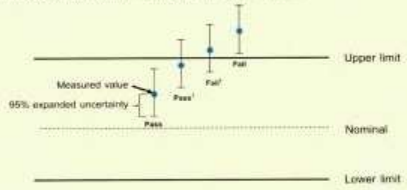
The standard decision rule employed for the statements of conformity to each calibration result will be applied using ILAC-G8:09/2019, Guidelines on the Reporting of Compliance with Specification as following Fig. and statements

Pass = The measurement result plus the expanded uncertainty with a 95% coverage probability were within the limit.

Pass[1] = The measurement result was within the limit. However, a portion of the expanded uncertainty of measurement at 95% exceeds the limit.

Fail[1] = The measurement result was out of the limit. However, a portion of the expanded uncertainty of measurement at 95% is within the limit.

Fail = The measurement result plus the expanded uncertainty with a 95% coverage probability were outside the limit.



End of Calibration

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Certificate of Calibration

Customer

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

Certificate No : 24/SLM/180
Request No : Req-2024-1105

Unit Under Calibration Details

Measurement item : Sound Level Meter
Manufacturer : SCARLET
Model : ST-21D
Serial Number : 820710
ID : ENSL 22181
Resolution : 0.1 dB

Microphone Class : 2
Microphone Model : AWA14423
Microphone S/N : A-000500
Preamplifier Model : -
Preamplifier S/N : -
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 : 21 May 2024
Calibrated Date : 28 May 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
Standard Microphone	GRAS	40AN	188273	21 August 2024	GRAS
Multifrequency Calibrator	Quest	Quest-cal	EFA000234	26 July 2024	TSI
Audio Generator	Svantek	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 %.

Calibrated By :
Mr. Noppadon Luangart
Service Calibration Engineer

Approved By :
Mr. Pacit Mathavorn
Calibration Engineer Supervisor

Issue Date : 28 May 2024

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Certificate No : 24-SLM-180
Request No : Req-2024-1105

1. Indication at the calibration check frequency

UUC Setting	Nominal	Before Adjust		After Adjust		UNCERTAINTY	Acceptance
FAST / A / 28-133	Level	UUC	ERR	UUC	ERR		Limit
Calibrator Setting	(dB)	(dB)	(dB)	(dB)	(dB)	(± dB)	(± dB)
1000 Hz 114 dB	114.18	114.3	-0.08	114.2	+0.02	0.20	0.30

Note : Absolute sensitivity was established by the use of Sound Calibrator Brand CASELLA, Model CEL-120/2, SN. 3865016

2. Self-generated noise, Microphone installed

UUC Setting	Measured	UNCERTAINTY
FAST / 28-133		
UUC Weighting	(dB)	(± dB)
A	23.6	0.10

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

UUC Setting	Measured	UNCERTAINTY
FAST / 28-133		
UUC Weighting	(dB)	(± dB)
A	22.5	0.10
C	23.4	0.10
Z	27.2	0.10

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

UUC Setting	Deviation from various Frequency Weighting Respone curve			UNCERTAINTY	Acceptance Limit
FAST / 28-133	A	C	Z		
STD Setting	(dB)	(dB)	(dB)	(± dB)	(± dB)
125 Hz	0.1	0.2	0.1	0.60	1.5
1000 Hz	0.0	0.0	0.0	0.60	1.0
4000 Hz	-0.5	-0.7	-0.8	0.60	3.0
8000 Hz	-0.7	-0.8	-0.6	0.70	5.0

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Certificate No : 24-SLM-180
Request No : Req-2024-1105

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

UUC Setting	Deviation from various Frequency Weighting Respone curve			UNCERTAINTY	Acceptance Limit
FAST / 28-133					
STD Setting	A (dB)	C (dB)	Z (dB)	(± dB)	(± dB)
63 Hz	-0.2	-0.1	-0.1	0.20	2.0
125 Hz	-0.1	0.0	0.0		1.5
250 Hz	-0.1	-0.1	0.0		1.5
500 Hz	-0.1	0.0	0.0		1.5
1000 Hz	0.0	0.0	0.0		1.0
2000 Hz	0.1	0.0	0.0		2.0
4000 Hz	0.2	0.2	0.0		3.0
8000 Hz	-0.1	-0.2	0.0		5.0

6. Frequency and time weightings at 1kHz

UUC Setting	STD	Measured		UNCERTAINTY	Acceptance Limit
FAST / 28-133	REF	UUC	ERR		
UUC Weighting	(dB)	(dB)	(dB)	(± dB)	(± dB)
A	114.00	114.0	0.0	0.20	0.20
C	114.00	113.9	-0.1		0.20
Z	114.00	113.9	-0.1		0.20

UUC Setting	STD	Measured		UNCERTAINTY	Acceptance Limit
28-133 / A	REF	UUC	ERR		
UUC Time Respone	(dB)	(dB)	(dB)	(± dB)	(± dB)
Fast	114.00	114.0	0.0	0.20	0.10
Slow	114.00	114.0	0.0		0.10
Leq	114.00	114.0	0.0		0.10

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

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Certificate No : 24-SLM-180
Request No : Req-2024-1105

7. Long Term Stability

UUC Setting	Measured	UNCERTAINTY	Acceptance Limit
FAST / A / 28-133	UUC		
STD Setting	(dB)	(± dB)	(± dB)
Initial	114.0	[redacted]	
Final	114.0		
Deviated	0.0	0.10	0.30

8. Level linearity on the reference level range

UUC Setting	Anticipated	Deviation		UNCERTAINTY	Acceptance Limit
FAST / A / 28-133	REF	UUC	ERR		
STD dB	(dB)	(dB)	(dB)	(± dB)	(± dB)
136.00	136	135.9	-0.1	0.30	0.5
135.00	135	134.9	-0.1		1.1
134.00	134	133.9	-0.1		1.1
129.00	129	129.0	0.0		1.1
124.00	124	124.0	0.0		1.1
119.00	119	119.0	0.0		1.1
114.00	114	114.0	0.0		1.1
109.00	109	108.9	-0.1		1.1
104.00	104	103.9	-0.1		1.1
99.00	99	98.9	-0.1		1.1
94.00	94	94.0	0.0		1.1
89.00	89	89.0	0.0		1.1
84.00	84	84.0	0.0		1.1
79.00	79	79.0	0.0		1.1
74.00	74	74.0	0.0		1.1
69.00	69	69.0	0.0		1.1
64.00	64	64.0	0.0		1.1
59.00	59	59.0	0.0		1.1
54.00	54	54.0	0.0		1.1
49.00	49	49.0	0.0		1.1
44.00	44	43.9	-0.1		1.1
39.00	39	38.8	-0.2		1.1
38.00	38	37.8	-0.2		1.1
37.00	37	36.7	-0.3		0.8
36.00	36	35.6	-0.4		1.1

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Certificate No : 24-SLM-180
Request No : Req-2024-1105

9. Level linearity including the level range control

UUC Setting	STD	Measured		UNCERTAINTY	Acceptance Limit
FAST / A	REF	UUC	ERR		
UUC Range	(dB)	(dB)	(dB)	(± dB)	(± dB)
28-133	40.90	40.9	0.0	0.30	1.1
	114	114.0	0.0		1.1

10. Tone burst response

UUC Setting	STD	Anticipated	Measured		UNCERTAINTY	Acceptance Limit
A / 28-133	Toneburst	Ref	UUC	ERR		
UUC Time Respone	(ms)	(dB)	(dB)	(dB)	(± dB)	(± dB)
Fast	200	129.0	129.1	+0.1	0.20	1.0
	2	112.0	112.0	0.0		+1.0, -2.5
	0.25	103.0	102.9	-0.1		+1.5, -5.0
Slow	200	122.6	122.7	+0.1		1.0
	2	103.0	103.1	+0.1		+1.0, -5.0
SEL	200	123.0	123.2	+0.2		1.0
	2	103.0	103.1	+0.1		+1.0, -2.5
	0.25	94.0	94.0	0.0		+1.5, -5.0

11. Peak C Sound level

UUC Setting	Anticipated	Measured		UNCERTAINTY	Acceptance Limit
FAST / C / 28-133	REF	UUC	ERR		
STD Setting	(dB)	(dB)	(dB)	(± dB)	(± dB)
Complete cycle	128.4	128.2	-0.20	0.20	3.0
Positive half cycle	127.4	127.3	-0.10		2.0
Negative half cycle	127.4	127.3	-0.10		2.0

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Certificate No : 24-SLM-180
Request No : Req-2024-1105

12. Overload indication

UUC Setting	Measured	UNCERTAINTY	Acceptance Limit
FAST / A / 28-133	UUC		
STD Setting	(dB)	(± dB)	(± dB)
Positive one-half cycle	138.6		
Negative one-half cycle	138.4		
Deviated	0.2	0.20	1.5

13. High Level Stability

UUC Setting	Measured	UNCERTAINTY	Acceptance Limit
FAST / A / 28-133	UUC		
STD Setting	(dB)	(± dB)	(± dB)
Initial	132.0		
Final	132.0		
Deviated	0.0	0.10	0.30

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 respone 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

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Certificate of Calibration

Customer

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

Certificate No : 24-SLM-184
Request No : Req-2024-1110

Unit Under Calibration Details

Measurement item : Sound Level Meter
Manufacturer : SCARLET
Model : ST-21D
Serial Number : 820711
ID : ENSL 22182
Resolution : 0.1 dB
Microphone Class : 2
Microphone Model : AWA14421
Microphone S/N : A-000281
Preamplifier Model : -
Preamplifier S/N : -
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 : 21 May 2024
Calibrated Date : 29 May 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
Standard Microphone	GRAS	40AN	188273	21 August 2024	GRAS
Multifrequency Calibrator	Quest	Quest-cal	EFA000234	26 July 2024	TSI
Audio Generator	Svantek	Svan901	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 %.

Calibrated By : Mr. Nopparuban Luangsri
Service Calibration Engineer

Approved By : Mr. Pacit Mathaviem
Calibration Engineer Supervisor

Issue Date : 29 May 2024

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.
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Certificate No : 24-SLM-184
Request No : Req-2024-1110

1. Indication at the calibration check frequency

UUC Setting	Nominal	Before Adjust		After Adjust		UNCERTAINTY	Acceptance Limit
FAST / A / 28-133	Level	UUC	ERR	UUC	ERR		
Calibrator Setting	(dB)	(dB)	(dB)	(dB)	(dB)	(± dB)	(± dB)
1000 Hz 114 dB	114.18	113.8	-0.38	114.2	+0.02	0.20	0.30

Note : Absolute sensitivity was established by the use of Sound Calibrator Brand CASELLA, Model CEL-120/2, SN. 3865016

2. Self-generated noise, Microphone installed

UUC Setting	Measured	UNCERTAINTY
FAST / 28-133		
UUC Weighting	(dB)	(± dB)
A	24.8	0.10

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

UUC Setting	Measured	UNCERTAINTY
FAST / 28-133		
UUC Weighting	(dB)	(± dB)
A	24.0	0.10
C	25.3	0.10
Z	29.7	0.10

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

UUC Setting	Deviation from various Frequency Weighting Respone curve			UNCERTAINTY	Acceptance Limit
FAST / 28-133	A	C	Z		
STD Setting	(dB)	(dB)	(dB)	(± dB)	(± dB)
125 Hz	0.1	0.2	0.2	0.60	1.5
1000 Hz	0.0	0.0	0.0	0.60	1.0
4000 Hz	-0.9	-0.9	-1.0	0.60	3.0
8000 Hz	-1.2	-1.2	-0.9	0.70	5.0

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Certificate No : 24-SLM-184
Request No : Req-2024-1110

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

UUC Setting	Deviation from various Frequency Weighting Respone curve			UNCERTAINTY	Acceptance Limit
FAST / 28-133					
STD Setting	A (dB)	C (dB)	Z (dB)	(± dB)	(± dB)
63 Hz	-0.1	-0.1	0.0	0.20	2.0
125 Hz	-0.1	0.0	0.0		1.5
250 Hz	-0.1	0.0	0.0		1.5
500 Hz	0.0	0.0	0.0		1.5
1000 Hz	0.0	0.0	0.0		1.0
2000 Hz	0.1	0.1	0.0		2.0
4000 Hz	0.2	0.2	0.0		3.0
8000 Hz	-0.1	-0.2	0.0		5.0

6. Frequency and time weightings at 1kHz

UUC Setting	STD	Measured		UNCERTAINTY	Acceptance Limit
FAST / 28-133	REF	UUC	ERR		
UUC Weighting	(dB)	(dB)	(dB)	(± dB)	(± dB)
A	114.00	114.0	0.0	0.20	0.20
C	114.00	113.9	-0.1		0.20
Z	114.00	113.9	-0.1		0.20

UUC Setting	STD	Measured		UNCERTAINTY	Acceptance Limit
28-133 / A	REF	UUC	ERR		
UUC Time Respone	(dB)	(dB)	(dB)	(± dB)	(± dB)
Fast	114.00	114.0	0.0	0.20	0.10
Slow	114.00	114.0	0.0		0.10
Leq	114.00	114.0	0.0		0.10

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Certificate No : 24-SLM-184
Request No : Req-2024-1110

7. Long Term Stability

UUC Setting	Measured	UNCERTAINTY	Acceptance Limit
FAST / A / 28-133	UUC		
STD Setting	(dB)	(± dB)	(± dB)
Initial	114.0	[redacted]	
Final	114.0		
Deviated	0.0	0.10	0.30

8. Level linearity on the reference level range

UUC Setting	Anticipated	Deviation		UNCERTAINTY	Acceptance Limit
FAST / A / 28-133	REF	UUC	ERR		
STD dB	(dB)	(dB)	(dB)	(± dB)	(± dB)
137.00	137	136.9	-0.1	0.30	1.1
134.00	134	134.0	0.0		1.1
129.00	129	129.0	0.0		1.1
124.00	124	124.0	0.0		1.1
119.00	119	119.0	0.0		1.1
114.00	114	114.0	0.0		1.1
109.00	109	109.0	0.0		1.1
104.00	104	104.1	0.1		1.1
99.00	99	99.1	0.1		1.1
94.00	94	94.1	0.1		1.1
89.00	89	89.1	0.1		1.1
84.00	84	84.1	0.1		1.1
79.00	79	79.1	0.1		1.1
74.00	74	74.1	0.1		1.1
69.00	69	69.1	0.1		1.1
64.00	64	64.1	0.1		1.1
59.00	59	59.1	0.1		1.1
54.00	54	54.1	0.1		1.1
49.00	49	49.1	0.1		1.1
44.00	44	44.1	0.1		1.1
39.00	39	39.1	0.1		1.1
38.00	38	38.9	0.9		1.1
37.00	37	37.9	0.9		1.1
36.00	36	36.6	0.6		1.1

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Certificate No : 24-SLM-184
Request No : Req-2024-1110

9. Level linearity including the level range control

UUC Setting	STD	Measured		UNCERTAINTY	Acceptance Limit
FAST / A	REF	UUC	ERR		
UUC Range	(dB)	(dB)	(dB)	(± dB)	(± dB)
28-133	41.80	41.9	0.1	0.30	1.1
	114	114.0	0.0		1.1

10. Tone burst response

UUC Setting	STD	Anticipated	Measured		UNCERTAINTY	Acceptance Limit
A / 28-133	Toneburst	Ref	UUC	ERR		
UUC Time Respone	(ms)	(dB)	(dB)	(dB)	(± dB)	(± dB)
Fast	200	129.0	129.1	+0.1	0.20	1.0
	2	112.0	111.8	-0.2		+1.0, -2.5
	0.25	103.0	102.7	-0.3		+1.5, -5.0
Slow	200	122.6	122.7	+0.1		1.0
	2	103.0	103.1	+0.1		+1.0, -5.0
SEL	200	123.0	123.2	+0.2		1.0
	2	103.0	103.2	+0.2		+1.0, -2.5
	0.25	94.0	94.0	0.0		+1.5, -5.0

11. Peak C Sound level

UUC Setting	Anticipated	Measured		UNCERTAINTY	Acceptance Limit
FAST / C / 28-133	REF	UUC	ERR		
STD Setting	(dB)	(dB)	(dB)	(± dB)	(± dB)
Complete cycle	128.4	128.3	-0.10	0.20	3.0
Positive half cycle	127.4	127.3	-0.10		2.0
Negative half cycle	127.4	127.3	-0.10		2.0

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

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Certificate No : 24-SLM-184
Request No : Req-2024-1110

12. Overload indication

UUC Setting	Measured	UNCERTAINTY	Acceptance Limit
FAST / A / 28-133	UUC		
STD Setting	(dB)	(± dB)	(± dB)
Positive one-half cycle	138.8	[redacted]	
Negative one-half cycle	139.3		
Deviated	-0.4	0.20	1.5

13. High Level Stability

UUC Setting	Measured	UNCERTAINTY	Acceptance Limit
FAST / A / 28-133	UUC		
STD Setting	(dB)	(± dB)	(± dB)
Initial	132.0	[redacted]	
Final	132.0		
Deviated	0.0	0.10	0.30

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 respone 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

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

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Certificate of Calibration

Customer

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

Certificate No : 23-SLM-178
Request No : Req-2023-1084

Unit Under Calibration Details

Measurement item : Sound Level Meter
Manufacturer : SCARLET
Model : ST-21D
Serial Number : 820712
ID : ENSL 22183
Resolution : 0.1 dB

Microphone Class : 2
Microphone Model : AWA14421
Microphone S/N : A-000218
Preamplifier Model : -
Preamplifier S/N : -
Intrument Status : Used

Calibration Environment and Details

Temperature : 23 °C ± 2 °C
Humidity : 50 %RH ± 20 %RH
Barometric Pressure : 1013 hPa ± 10 hPa
Received Date : 19 May 2023
Calibrated Date : 24 May 2023
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
Standard Microphone	GRAS	40AN	188273	6 October 2023	GRAS
Multifrequency Calibrator	Quest	Quest-cal	EFA000234	29 June 2023	TSI
Audio Generator	Svantek	Svan401	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 %.

Calibrated By : Mr. Noppadon Luangart
Calibration Officer

Approved By : Mr. Pacit Mathavorn
Calibration Engineer Supervisor

Issue Date : 24 May 2023

VERIFIED
BY: [redacted] DATE: May 26, 2023

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Certificate No : 23-SLM-178
Request No : Req-2023-1084

1. Indication at the calibration check frequency

UUC Setting	Nominal	Before Adjust		After Adjust		UNCERTAINTY	Acceptance
FAST / A / 28-133	Level	UUC	ERR	UUC	ERR		Limit
Calibrator Setting	(dB)	(dB)	(dB)	(dB)	(dB)	(± dB)	(± dB)
1000 Hz 94 dB	93.81	93.3	-0.51	93.8	-0.01	0.2	0.3

Note : Absolute sensitivity was established by the use of Sound Calibrator Brand SOUNDTEK, Model ST-120, SN. 211203780

2. Self-generated noise, Microphone installed

UUC Setting	Measured	UNCERTAINTY
FAST / 28-133		
UUC Weighting	(dB)	(± dB)
A	23.3	0.1

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

UUC Setting	Measured	UNCERTAINTY
FAST / 28-133		
UUC Weighting	(dB)	(± dB)
A	22.6	0.1
C	22.3	0.1
Z	26.2	0.1

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

UUC Setting	Deviation from various Frequency Weighting Respone curve			UNCERTAINTY	Acceptance Limit
FAST / 28-133	A	C	Z		
STD Setting	(dB)	(dB)	(dB)	(± dB)	(± dB)
125 Hz	0.0	0.2	0.2	0.6	2.0
1000 Hz	0.0	0.0	0.0	0.6	1.0
4000 Hz	-0.7	-0.6	-0.9	0.6	3.0
8000 Hz	-0.9	-0.9	-0.7	0.7	5.0

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FM-708-SLM-01 Rev.0 Issue date 01/07/19

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TEL : 0669-2116-5860-1 FAX: 0669-2116-7140

Certificate No : 23-SLM-178
Request No : Req-2023-1084

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

UUC Setting	Deviation from various Frequency Weighting Respone curve			UNCERTAINTY	Acceptance Limit
FAST / 28-133					
STD Setting	A (dB)	C (dB)	Z (dB)	(± dB)	(± dB)
63 Hz	-0.2	-0.1	0.0	0.2	2.0
125 Hz	-0.1	0.0	0.0		1.5
250 Hz	-0.1	-0.1	0.0		1.5
500 Hz	0.0	0.0	0.0		1.5
1000 Hz	0.0	0.0	0.0		1.0
2000 Hz	0.1	0.0	0.0		2.0
4000 Hz	0.2	0.2	0.0		3.0
8000 Hz	-0.1	-0.2	0.0		5

6. Frequency and time weightings at 1kHz

UUC Setting	STD	Measured		UNCERTAINTY	Acceptance Limit
FAST / 28-133	REF	UUC	ERR		
UUC Weighting	(dB)	(dB)	(dB)	(± dB)	(± dB)
A	114.00	114.0	0.0	0.2	0.2
C	114.00	113.9	-0.1		0.2
Z	114.00	113.9	-0.1		0.2

UUC Setting	STD	Measured		UNCERTAINTY	Acceptance Limit
28-133 / A	REF	UUC	ERR		
UUC Time Respone	(dB)	(dB)	(dB)	(± dB)	(± dB)
Fast	114.00	114.0	0.0	0.2	0.1
Slow	114.00	114.0	0.0		0.1
Leq	114.00	114.0	0.0		0.1

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FM-708-SLM-01 Rev.0 Issue date 01/07/19

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Certificate No : 23-SLM-178
Request No : Req-2023-1084

7. Long Term Stability

UUC Setting	Measured	UNCERTAINTY	Acceptance Limit
FAST / A / 28-133	UUC		
STD Setting	(dB)	(± dB)	(± dB)
Initial	114.0	[redacted]	
Final	114.0		
Deviated	0.0	0.1	0.3

8. Level linearity on the reference level range

UUC Setting	Anticipated	Deviation		UNCERTAINTY	Acceptance Limit
FAST / A / 28-133	REF	UUC	ERR		
STD dB	(dB)	(dB)	(dB)	(± dB)	(± dB)
136.00	136	135.9	-0.1	0.3	0.8
135.00	135	134.9	-0.1		1.1
134.00	134	133.9	-0.1		1.1
129.00	129	128.9	-0.1		1.1
124.00	124	124.0	0.0		1.1
119.00	119	119.0	0.0		1.1
114.00	114	114.0	0.0		1.1
109.00	109	108.9	-0.1		1.1
104.00	104	103.9	-0.1		1.1
99.00	99	98.9	-0.1		1.1
94.00	94	94.0	0.0		1.1
89.00	89	89.0	0.0		1.1
84.00	84	84.0	0.0		1.1
79.00	79	79.0	0.0		1.1
74.00	74	74.0	0.0		1.1
69.00	69	69.0	0.0		1.1
64.00	64	64.0	0.0		1.1
59.00	59	59.0	0.0		1.1
54.00	54	54.0	0.0		1.1
49.00	49	49.0	0.0		1.1
44.00	44	43.9	-0.1		1.1
39.00	39	38.8	-0.2		1.1
38.00	38	37.8	-0.2		1.1
37.00	37	36.7	-0.3		0.8
36.00	36	35.6	-0.4		1.1

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Certificate No : 23-SLM-178
Request No : Req-2023-1084

9. Level linearity including the level range control

UUC Setting	STD	Measured		UNCERTAINTY	Acceptance Limit
FAST / A	REF	UUC	ERR		
UUC Range	(dB)	(dB)	(dB)	(± dB)	(± dB)
28-133	41.4	41.5	0.1	0.3	1.1
	114	114.0	0.0		1.1

10. Tone burst response

UUC Setting	STD	Anticipated	Measured		UNCERTAINTY	Acceptance Limit
A / 28-133	Toneburst	Ref	UUC	ERR		
UUC Time Respone	(ms)	(dB)	(dB)	(dB)	(± dB)	(± dB)
Fast	200	129.0	129.1	+0.1	0.2	1
	2	112.0	112.1	+0.1		+1.0, -2.5
	0.25	103.0	102.7	-0.3		+1.5, -5.0
Slow	200	122.0	122.7	+0.1		1
	2	103.0	103.1	+0.1		+1.0, -5.0
SEL	200	123.0	123.2	+0.2		1
	2	103.0	103.1	+0.1		+1.0, -2.5
	0.25	94.0	94.0	0.0		+1.5, -5.0

11. Peak C Sound level

UUC Setting	Anticipated	Measured		UNCERTAINTY	Acceptance Limit
FAST / C / 28-133	REF	UUC	ERR		
STD Setting	(dB)	(dB)	(dB)	(± dB)	(± dB)
Complete cycle	128.4	127.7	-0.70	0.2	3.0
Positive half cycle	127.4	127.4	0.00		2.0
Negative half cycle	127.4	127.4	0.00		2.0

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FM-708-SLM-01 Rev.0 Issue date 01/07/19

Certificate No : 23-SLM-178
Request No : Req-2023-1084

12. Overload indication

UUC Setting	Measured	UNCERTAINTY	Acceptance Limit
FAST / A / 28-133	UUC		
STD Setting	(dB)	(± dB)	(± dB)
Positive one-half cycle	138.4		
Negative one-half cycle	139.6		
Deviated	-1.2	0.2	1.5

13. High Level Stability

UUC Setting	Measured	UNCERTAINTY	Acceptance Limit
FAST / A / 28-133	UUC		
STD Setting	(dB)	(± dB)	(± dB)
Initial	132.0		
Final	132.0		
Deviated	0.0	0.1	0.3

End of Certificate

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FM-708-SLM-01 Rev.0 Issue date 01/07/19

Certificate of Calibration

Customer

Name : SGS (Thailand) Limited.
Address : 180 Nanglinchee Road, Chongnonsi, Yannawa Bangkok 10120

Certificate No : 24-SLM-219
Request No : Req-2024-1503

Unit Under Calibration Details

Measurement item : Sound Level Meter
Manufacturer : SCARLET
Model : ST-21D
Serial Number : 820714
ID : ENSL 22185
Resolution : 0.1 dB

Microphone Class : 2
Microphone Model : AWA14421
Microphone S/N : A-000220
Preamplifier Model : -
Preamplifier S/N : -
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 : 2 July 2024
Calibrated Date : 4 July 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
Standard Microphone	GRAS	40AN	188273	20 August 2024	GRAS
Multifrequency Calibrator	Quest	Quest-cal	EFA000234	26 July 2024	TSI
Audio Generator	Svantek	Svan401	131	8 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 %.

Calibrated By :
Mr. Noppadon Luangsart
Service Calibration Engineer

Approved By :
Mr. Pacit Mathavorn
Calibration Engineer Supervisor

Issue Date : 4 July 2024

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FM-708-SLM-01 Rev.04 Issue date 5/4/24

Certificate No : 24-SLM-219
Request No : Req-2024-1503

1. Indication at the calibration check frequency

UUC Setting	Nominal	Before Adjust		After Adjust		UNCERTAINTY	Acceptance Limit	Result
FAST / A / 28-133	Level	UUC	ERR	UUC	ERR			
Calibrator Setting	(dB)	(dB)	(dB)	(dB)	(dB)	(± dB)	(± dB)	
1000 Hz 114 dB	93.84	93.7	-0.14	93.8	-0.04	0.20	0.30	Pass

Note : Absolute sensitivity was established by the use of Sound Calibrator Brand CRIFFER, Model CR2 PLUS, SN. 37001157

2. Self-generated noise, Microphone installed

UUC Setting	Measured	UNCERTAINTY
FAST / 28-133		
UUC Weighting	(dB)	(± dB)
A	24.4	0.10

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

UUC Setting	Measured	UNCERTAINTY
FAST / 28-133		
UUC Weighting	(dB)	(± dB)
A	23.9	0.10
C	25.1	0.10
Z	29.8	0.10

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

UUC Setting	Deviation from various Frequency Weighting Respone curve			UNCERTAINTY	Acceptance Limit	Result
FAST / 28-133	A	C	Z			
STD Setting	(dB)	(dB)	(dB)	(± dB)	(± dB)	
125 Hz	0.0	0.1	0.2	0.60	1.5	Pass
1000 Hz	0.0	0.0	0.0	0.60	1.0	Pass
4000 Hz	-0.1	0.0	-0.2	0.60	3.0	Pass
8000 Hz	-0.2	-0.2	0.1	0.70	5.0	Pass

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FM-708-SLM-01 Rev.04 Issue date 5/4/24

Certificate No : 24-SLM-219
Request No : Req-2024-1503

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

UUC Setting	Deviation from various Frequency Weighting Respone curve			UNCERTAINTY	Acceptance Limit	Result
FAST / 28-133						
STD Setting	A (dB)	C (dB)	Z (dB)	(± dB)	(± dB)	
63 Hz	-0.2	-0.1	-0.1	0.20	2.0	Pass
125 Hz	-0.1	-0.1	-0.1		1.5	Pass
250 Hz	-0.1	-0.1	-0.1		1.5	Pass
500 Hz	-0.1	-0.1	-0.1		1.5	Pass
1000 Hz	0.0	-0.1	-0.1		1.0	Pass
2000 Hz	0.1	0.0	-0.1		2.0	Pass
4000 Hz	0.2	0.1	-0.1		3.0	Pass
8000 Hz	-0.2	-0.2	-0.1		5.0	Pass

6. Frequency and time weightings at 1kHz

UUC Setting	STD	Measured		UNCERTAINTY	Acceptance Limit	Result
FAST / 28-133	REF	UUC	ERR			
UUC Weighting	(dB)	(dB)	(dB)	(± dB)	(± dB)	
A	114.00	114.0	0.0	0.20	0.20	Pass
C	114.00	113.9	-0.1		0.20	Pass
Z	114.00	113.9	-0.1		0.20	Pass

UUC Setting	STD	Measured		UNCERTAINTY	Acceptance Limit	Result
28-133 / A	REF	UUC	ERR			
UUC Time Respone	(dB)	(dB)	(dB)	(± dB)	(± dB)	
Fast	114.00	114.0	0.0	0.20	0.10	Pass
Slow	114.00	114.0	0.0		0.10	Pass
Leq	114.00	114.0	0.0		0.10	Pass

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FM-708-SLM-01 Rev.04 Issue date 5/4/24

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Certificate No : 24-SLM-219
Request No : Req-2024-1503

7. Long Term Stability

UUC Setting	Measured	UNCERTAINTY	Acceptance Limit	Result
FAST / A / 28-133	UUC			
STD Setting	(dB)	(± dB)	(± dB)	
Initial	114.0			
Final	114.0			
Deviated	0.0	0.10	0.30	Pass

8. Level linearity on the reference level range

UUC Setting	Anticipated	Deviation		UNCERTAINTY	Acceptance Limit	Result
FAST / A / 28-133	REF	UUC	ERR			
STD dB	(dB)	(dB)	(dB)	(± dB)	(± dB)	
138.00	138	137.9	-0.1	0.30	1.1	Pass
134.00	134	134.0	0.0		1.1	Pass
129.00	129	129.0	0.0		1.1	Pass
124.00	124	124.0	0.0		1.1	Pass
119.00	119	119.0	0.0		1.1	Pass
114.00	114	114.0	0.0		1.1	Pass
109.00	109	109.0	0.0		1.1	Pass
104.00	104	104.1	0.1		1.1	Pass
99.00	99	98.1	0.1		1.1	Pass
94.00	94	94.1	0.1		1.1	Pass
89.00	89	89.1	0.1		1.1	Pass
84.00	84	84.1	0.1		1.1	Pass
79.00	79	79.1	0.1		1.1	Pass
74.00	74	74.1	0.1		1.1	Pass
69.00	69	69.1	0.1		1.1	Pass
64.00	64	64.1	0.1		1.1	Pass
59.00	59	59.1	0.1		1.1	Pass
54.00	54	54.1	0.1		1.1	Pass
49.00	49	49.1	0.1		1.1	Pass
44.00	44	44.0	0.0		1.1	Pass
39.00	39	38.9	-0.1		1.1	Pass
38.00	38	37.8	-0.2		1.1	Pass

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Certificate No : 24-SLM-219
Request No : Req-2024-1503

9. Level linearity including the level range control

UUC Setting	STD	Measured		UNCERTAINTY	Acceptance Limit	Result
FAST / A	REF	UUC	ERR			
UUC Range	(dB)	(dB)	(dB)	(± dB)	(± dB)	
28-133	42.90	43.0	0.1	0.30	1.1	Pass
	114	114.0	0.0		1.1	Pass

10. Tone burst response

UUC Setting	STD	Anticipated	Measured		UNCERTAINTY	Acceptance Limit	Result
A / 28-133	Toneburst	Ref	UUC	ERR			
UUC Time Respone	(ms)	(dB)	(dB)	(dB)	(± dB)	(± dB)	
Fast	200	129.0	129.1	+0.1	0.20	1.0	Pass
	2	112.0	111.9	-0.1		+1.0, -2.5	Pass
	0.25	103.0	102.9	-0.1		+1.5, -5.0	Pass
Slow	200	122.6	122.7	+0.1		1.0	Pass
	2	103.0	103.1	+0.1		+1.0, -5.0	Pass
SEL	200	123.0	123.2	+0.2		1.0	Pass
	2	103.0	103.1	+0.1		+1.0, -2.5	Pass
	0.25	94.0	94.0	0.0		+1.5, -5.0	Pass

11. Peak C Sound level

UUC Setting	Anticipated	Measured		UNCERTAINTY	Acceptance Limit	Result
FAST / C / 28-133	REF	UUC	ERR			
STD Setting	(dB)	(dB)	(dB)	(± dB)	(± dB)	
Complete cycle	128.4	128.1	-0.30	0.20	3.0	Pass
Positive half cycle	127.4	127.3	-0.10		2.0	Pass
Negative half cycle	127.4	127.3	-0.10		2.0	Pass

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FM-708-SLM-01 Rev.04 Issue date 5/8/24

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Certificate No : 24-SLM-219
Request No : Req-2024-1503

12. Overload indication

UUC Setting	Measured	UNCERTAINTY	Acceptance Limit	Result
FAST / A / 28-133	UUC			
STD Setting	(dB)	(± dB)	(± dB)	
Positive one-half cycle	140.4			
Negative one-half cycle	140.6			
Deviated	-0.2	0.20	1.5	Pass

13. High Level Stability

UUC Setting	Measured	UNCERTAINTY	Acceptance Limit	Result
FAST / A / 28-133	UUC			
STD Setting	(dB)	(± dB)	(± dB)	
Initial	132.0			
Final	132.0			
Deviated	0.0	0.10	0.30	Pass

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

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Request No : Req-2024-1503

Decision Rule for Statements of Conformity

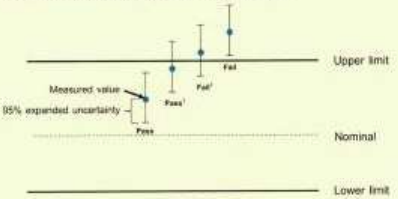
The standard decision rule employed for the statements of conformity to each calibration result will be applied using ILAC-G8:09/2019, Guidelines on the Reporting of Compliance with Specification as following Fig. and statement

Pass = The measurement result plus the expanded uncertainty with a 95% coverage probability were within the limit.

Pass[1] = The measurement result was within the limit. However, a portion of the expanded uncertainty of measurement at 95% exceeds the limit.

Fail[1] = The measurement result was out of the limit. However, a portion of the expanded uncertainty of measurement at 95% is within the limit.

Fail = The measurement result plus the expanded uncertainty with a 95% coverage probability were outside the limit.



End of Certificate

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Certificate of Calibration

Customer

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

Certificate No : 23-SLM-175
Request No : Req-2023-1087

Unit Under Calibration Details

Measurement item : Sound Level Meter
Manufacturer : SCARLET
Model : ST-21D
Serial Number : 820716
ID : ENSL 22187
Resolution : 0.1 dB

Microphone Class : 2
Microphone Model : AWA14421
Microphone S/N : A-000227
Preamplifier Model : -
Preamplifier S/N : -
Intrument Status : Used

Calibration Environment and Details

Temperature : 23 °C ± 2 °C
Humidity : 50 %RH ± 20 %RH
Barometric Pressure : 1013 hPa ± 10 hPa
Received Date : 19 May 2023
Calibrated Date : 23 May 2023
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	Traceblity
Standard Microphone	GRAS	40AN	188273	6 October 2023	GRAS
Multifrequency Calibrator	Quest	Quest-cal	EFA000234	29 June 2023	TSI
Audio Generator	Svantek	Svan401	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 %.

Calibrated By : Mr. Noppadon Luangart
Calibration Officer

Approved By : Mr. Pacit Mathavorn
Calibration Engineer Supervisor

Issue Date : 23 May 2023

VERIFIED
BY PWisek DATE May 08, 2023

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Certificate No : 23-SLM-175
Request No : Req-2023-1087

1. Indication at the calibration check frequency

UUC Setting	Nominal	Before Adjust		After Adjust		UNCERTAINTY	Acceptance
FAST / A / 28-133	Level	UUC	ERR	UUC	ERR		Limit
Calibrator Setting	(dB)	(dB)	(dB)	(dB)	(dB)	(± dB)	(± dB)
1000 Hz 94 dB	93.81	95.2	+1.39	93.8	-0.01	0.2	0.3

Note : Absolute sensitivity was established by the use of Sound Calibrator Brand SOUNDTEK, Model ST-120, SN. 211203780

2. Self-generated noise, Microphone installed

UUC Setting	Measured	UNCERTAINTY
FAST / 28-133		
UUC Weighting	(dB)	(± dB)
A	24.4	0.1

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

UUC Setting	Measured	UNCERTAINTY
FAST / 28-133		
UUC Weighting	(dB)	(± dB)
A	24.0	0.1
C	23.9	0.1
Z	28.0	0.1

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

UUC Setting	Deviation from various Frequency Weighting Respone curve			UNCERTAINTY	Acceptance Limit
FAST / 28-133	A	C	Z		
STD Setting	(dB)	(dB)	(dB)	(± dB)	(± dB)
125 Hz	0.0	0.2	0.1	0.6	2.0
1000 Hz	0.0	0.0	0.0	0.6	1.0
4000 Hz	-0.1	0.0	-0.3	0.6	3.0
8000 Hz	-0.2	-0.1	-0.8	0.7	5.0

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FM-780-SLM-01 Rev.0 Issue date 01/07/19

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TEL : 0669-2136-5866-8 FAX: 0669-2136-7140

Certificate No : 23-SLM-175
Request No : Req-2023-1087

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

UUC Setting	Deviation from various Frequency Weighting Respone curve			UNCERTAINTY	Acceptance Limit
FAST / 28-133					
STD Setting	A (dB)	C (dB)	Z (dB)	(± dB)	(± dB)
63 Hz	-0.1	-0.1	0.0	0.2	2.0
125 Hz	-0.1	0.0	0.0		1.5
250 Hz	-0.1	0.0	0.0		1.4
500 Hz	0.0	0.0	0.0		1.4
1000 Hz	0.0	0.0	0.0		1.0
2000 Hz	0.1	0.1	0.0		2.0
4000 Hz	0.2	0.2	0.0		3.0
8000 Hz	-0.1	-0.2	0.0		5

6. Frequency and time weightings at 1kHz

UUC Setting	STD	Measured		UNCERTAINTY	Acceptance
FAST / 28-133	REF	UUC	ERR		Limit
UUC Weighting	(dB)	(dB)	(dB)	(± dB)	(± dB)
A	114.00	114.0	0.0	0.2	0.2
C	114.00	113.9	-0.1		0.2
Z	114.00	113.9	-0.1		0.2

UUC Setting	STD	Measured		UNCERTAINTY	Acceptance
28-133 / A	REF	UUC	ERR		Limit
UUC Time Respone	(dB)	(dB)	(dB)	(± dB)	(± dB)
Fast	114.00	114.0	0.0	0.2	0.1
Slow	114.00	114.0	0.0		0.1
Leq	114.00	114.0	0.0		0.1

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FM-780-SLM-01 Rev.0 Issue date 01/07/19

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TEL : 0669-2136-5866-8 FAX: 0669-2136-7140

Certificate No : 23-SLM-175
Request No : Req-2023-1087

7. Long Term Stability

UUC Setting	Measured	UNCERTAINTY	Acceptance
FAST / A / 28-133	UUC		Limit
STD Setting	(dB)	(± dB)	(± dB)
Initial	114.0	[redacted]	[redacted]
Final	114.0		
Deviated	0.0	0.1	0.3

8. Level linearity on the reference level range

UUC Setting	Anticipated	Deviation		UNCERTAINTY	Acceptance
FAST / A / 28-133	REF	UUC	ERR		Limit
STD dB	(dB)	(dB)	(dB)	(± dB)	(± dB)
137.00	137	137.0	0.0	0.3	0.8
136.00	136	136.0	0.0		0.9
135.00	135	135.0	0.0		1.1
134.00	134	134.0	0.0		1.1
129.00	129	129.0	0.0		1.1
124.00	124	124.0	0.0		1.1
119.00	119	119.0	0.0		1.1
114.00	114	114.0	0.0		1.1
109.00	109	109.0	0.0		1.1
104.00	104	104.0	0.0		1.1
99.00	99	99.0	0.0		1.1
94.00	94	94.0	0.0		1.1
89.00	89	89.1	0.1		1.1
84.00	84	84.1	0.1		1.1
79.00	79	79.1	0.1		1.1
74.00	74	74.1	0.1		1.1
69.00	69	69.1	0.1		1.1
64.00	64	64.1	0.1		1.1
59.00	59	59.1	0.1		1.1
54.00	54	54.1	0.1		1.1
49.00	49	49.1	0.1		1.1
44.00	44	44.1	0.1		1.1
39.00	39	38.9	-0.1		1.1
38.00	38	37.8	-0.2		1.1
37.00	37	36.8	-0.2		0.8
36.00	36	35.7	-0.3		1.1

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FM-780-SLM-01 Rev.0 Issue date 01/07/19

Certificate No : 23-SLM-175
Request No : Req-2023-1087

9. Level linearity including the level range control

UUC Setting	STD	Measured		UNCERTAINTY	Acceptance
FAST / A	REF	UUC	ERR		Limit
UUC Range	(dB)	(dB)	(dB)	(± dB)	(± dB)
28-133	42.1	42.3	0.2	0.3	1.1
	114	114.0	0.0		1.1

10. Tone burst response

UUC Setting	STD	Anticipated	Measured		UNCERTAINTY	Acceptance
A / 28-133	Toneburst	Ref	UUC	ERR		Limit
UUC Time Respose	(ms)	(dB)	(dB)	(dB)	(± dB)	(± dB)
Fast	200	129.0	129.2	+0.2	0.2	1
	2	112.0	112.0	0.0		+1.0, -2.5
	0.25	103.0	103.0	0.0		+1.5, -5.0
Slow	200	122.6	122.6	0.0		1
	2	103.0	102.9	-0.1		+1.0, -5.0
SEL	200	123.0	123.1	+0.1		1
	2	103.0	103.0	0.0		+1.0, -2.5
	0.25	94.0	93.8	-0.2		+1.5, -5.0

11. Peak C Sound level

UUC Setting	Anticipated	Measured		UNCERTAINTY	Acceptance
FAST / C / 28-133	REF	UUC	ERR		Limit
STD Setting	(dB)	(dB)	(dB)	(± dB)	(± dB)
Complete cycle	128.4	128.1	-0.30	0.2	3.0
Positive half cycle	127.4	127.2	-0.20		2.0
Negative half cycle	127.4	127.2	-0.20		2.0

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FM-708-SLM-01 Rev.0 Issue date 01/07/19

Certificate No : 23-SLM-175
Request No : Req-2023-1087

12. Overload indication

UUC Setting	Measured	UNCERTAINTY	Acceptance
FAST / A / 28-133	UUC		Limit
STD Setting	(dB)	(± dB)	(± dB)
Positive one-half cycle	139.7		
Negative one-half cycle	140.2		
Deviated	-0.5	0.2	1.5

13. High Level Stability

UUC Setting	Measured	UNCERTAINTY	Acceptance
FAST / A / 28-133	UUC		Limit
STD Setting	(dB)	(± dB)	(± dB)
Initial	132.0		
Final	132.0		
Deviated	0.0	0.1	0.3

End of Certificate

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FM-708-SLM-01 Rev.0 Issue date 01/07/19

Certificate of Calibration

Customer

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

Certificate No : 24-SLM-181
Request No : Req-2024-1106

Unit Under Calibration Details

Measurement item : Sound Level Meter
Manufacturer : SCARLET
Model : ST-21D
Serial Number : 820716
ID : ENSL 22187
Resolution : 0.1 dB

Microphone Class : 2
Microphone Model : AWA14421
Microphone S/N : A-000283
Preamplifier Model : -
Preamplifier S/N : -
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 : 21 May 2024
Calibrated Date : 29 May 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
Standard Microphone	GRAS	40AN	188273	21 August 2024	GRAS
Multifrequency Calibrator	Quest	Quest-cal	EFA000234	26 July 2024	TSI
Audio Generator	Svantek	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 %.

Calibrated By :
Mr. Noppadon Luangsri
Service Calibration Engineer

Approved By :
Mr. Pacit Mathavorn
Calibration Engineer Supervisor

Issue Date : 29 May 2024

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

Certificate No : 24-SLM-181
Request No : Req-2024-1106

1. Indication at the calibration check frequency

UUC Setting	Nominal	Before Adjust		After Adjust		UNCERTAINTY	Acceptance
FAST / A / 28-133	Level	UUC	ERR	UUC	ERR		Limit
Calibrator Setting	(dB)	(dB)	(dB)	(dB)	(dB)	(± dB)	(± dB)
1000 Hz 114 dB	114.18	114.1	-0.08	114.2	+0.02	0.20	0.30

Note : Absolute sensitivity was established by the use of Sound Calibrator Brand CASELLA, Model CEL-120/2, SN. 3865016

2. Self-generated noise, Microphone installed

UUC Setting	Measured	UNCERTAINTY
FAST / 28-133		
UUC Weighting	(dB)	(± dB)
A	25.5	0.10

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

UUC Setting	Measured	UNCERTAINTY
FAST / 28-133		
UUC Weighting	(dB)	(± dB)
A	24.8	0.10
C	25.7	0.10
Z	30.6	0.10

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

UUC Setting	Deviation from various Frequency Weighting Respone curve			UNCERTAINTY	Acceptance Limit
FAST / 28-133	A	C	Z		
STD Setting	(dB)	(dB)	(dB)	(± dB)	(± dB)
125 Hz	0.0	0.1	0.1	0.60	1.5
1000 Hz	0.0	0.0	0.0	0.60	1.0
4000 Hz	-0.1	-0.1	-0.3	0.60	3.0
8000 Hz	-0.1	-0.2	0.0	0.70	5.0

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TEL. 66(0)-2116-5560-1 FAX: 66(0)-2116-7140

Certificate No : 24-SLM-181
Request No : Req-2024-1106

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

UUC Setting	Deviation from various Frequency Weighting Response curve			UNCERTAINTY	Acceptance Limit
FAST / 58-133					
STD Setting	A (dB)	C (dB)	Z (dB)	(± dB)	(± dB)
63 Hz	-0.2	-0.2	-0.1	0.20	2.0
125 Hz	-0.2	-0.1	-0.1		1.5
250 Hz	-0.2	-0.1	-0.1		1.5
500 Hz	-0.1	-0.1	-0.1		1.5
1000 Hz	0.0	-0.1	-0.1		1.0
2000 Hz	0.0	0.0	-0.1		2.0
4000 Hz	0.2	0.1	-0.1		3.0
8000 Hz	-0.2	-0.3	-0.1		5.0

6. Frequency and time weightings at 1kHz

UUC Setting	STD	Measured		UNCERTAINTY	Acceptance Limit
FAST / 58-133	REF	UUC	ERR		
UUC Weighting	(dB)	(dB)	(dB)	(± dB)	(± dB)
A	114.00	114.0	0.0	0.20	0.20
C	114.00	113.9	-0.1		0.20
Z	114.00	113.9	-0.1		0.20

UUC Setting	STD	Measured		UNCERTAINTY	Acceptance Limit
58-133 / A	REF	UUC	ERR		
UUC Time Respone	(dB)	(dB)	(dB)	(± dB)	(± dB)
Fast	114.00	114.0	0.0	0.20	0.10
Slow	114.00	114.0	0.0		0.10
Leq	114.00	114.0	0.0		0.10

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Certificate No : 24-SLM-181
Request No : Req-2024-1106

7. Long Term Stability

UUC Setting	Measured	UNCERTAINTY	Acceptance Limit
FAST / A / 58-133	UUC		
STD Setting	(dB)	(± dB)	(± dB)
Initial	114.0		
Final	114.0		
Deviated	0.0	0.10	0.30

8. Level linearity on the reference level range

UUC Setting	Anticipated	Deviation		UNCERTAINTY	Acceptance Limit
FAST / A / 58-133	REF	UUC	ERR		
STD dB	(dB)	(dB)	(dB)	(± dB)	(± dB)
138.00	138	138.0	0.0	0.30	1.1
134.00	134	134.0	0.0		1.1
129.00	129	129.0	0.0		1.1
124.00	124	124.0	0.0		1.1
119.00	119	119.0	0.0		1.1
114.00	114	114.0	0.0		1.1
109.00	109	109.1	0.1		1.1
104.00	104	104.2	0.2		1.1
99.00	99	99.2	0.2		1.1
94.00	94	94.2	0.2		1.1
89.00	89	89.2	0.2		1.1
84.00	84	84.2	0.2		1.1
79.00	79	79.2	0.2		1.1
74.00	74	74.2	0.2		1.1
69.00	69	69.2	0.2		1.1
64.00	64	64.2	0.2		1.1
59.00	59	59.2	0.2		1.1
54.00	54	54.2	0.2		1.1
49.00	49	49.2	0.2		1.1
44.00	44	44.1	0.1		1.1
39.00	39	38.9	-0.1		1.1
38.00	38	37.9	-0.1		1.1

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

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Certificate No : 24-SLM-181
Request No : Req-2024-1106

9. Level linearity including the level range control

UUC Setting	STD	Measured		UNCERTAINTY	Acceptance Limit
FAST / A	REF	UUC	ERR		
UUC Range	(dB)	(dB)	(dB)	(± dB)	(± dB)
58-133	43.30	43.4	0.1	0.30	1.1
	114	114.0	0.0		1.1

10. Tone burst response

UUC Setting	STD	Anticipated	Measured		UNCERTAINTY	Acceptance Limit
A / 28-133	Toneburst	Ref	UUC	ERR		
UUC Time Respone	(ms)	(dB)	(dB)	(dB)	(± dB)	(± dB)
Fast	200	129.0	129.1	+0.1	0.20	1.0
	2	112.0	111.8	-0.2		+1.0, -2.5
	0.25	103.0	102.9	-0.1		+1.5, -5.0
Slow	200	122.6	122.7	+0.1		1.0
	2	103.0	103.0	0.0		+1.0, -5.0
SEL	200	123.0	123.1	+0.1		1.0
	2	103.0	103.1	+0.1		+1.0, -2.5
	0.25	94.0	93.9	-0.1		+1.5, -5.0

11. Peak C Sound level

UUC Setting	Anticipated	Measured		UNCERTAINTY	Acceptance Limit
FAST / C / 28-133	REF	UUC	ERR		
STD Setting	(dB)	(dB)	(dB)	(± dB)	(± dB)
Complete cycle	128.4	128.1	-0.30	0.20	3.0
Positive half cycle	127.4	127.3	-0.10		2.0
Negative half cycle	127.4	127.3	-0.10		2.0

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
7 SOI MOO 13, SOI SUNTISAKORN 11 TAMBON BANG KAPO,
AMPHOE BANG PHLI SAMUT PRAKAN PROVINCE 10540 THAILAND
TEL. 66(0)-2116-5560-1 FAX: 66(0)-2116-7140

Certificate No : 24-SLM-181
Request No : Req-2024-1106

12. Overload indication

UUC Setting	Measured	UNCERTAINTY	Acceptance Limit
FAST / A / 28-133	UUC		
STD Setting	(dB)	(± dB)	(± dB)
Positive one-half cycle	140.5		
Negative one-half cycle	140.8		
Deviated	-0.3	0.20	1.5

13. High Level Stability

UUC Setting	Measured	UNCERTAINTY	Acceptance Limit
FAST / A / 28-133	UUC		
STD Setting	(dB)	(± dB)	(± dB)
Initial	132.0		
Final	132.0		
Deviated	0.0	0.10	0.30

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 respone 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

ENSL 22191

INNOVATIVE INSTRUMENT CALIBRATION LAB
INNOVATIVE INSTRUMENT CO., LTD. HEAD OFFICE
7 139 MOO 13, SOI SUNTINAKORN 11 TAMBON BANG KAEO
AMPHOE BANG PHLI SAMUT PRAKAN PROVINCE 10540 THAILAND
TEL : 0660-2116-5860-1 FAX: 0660-2116-7140

Certificate of Calibration

Customer

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

Certificate No : 23-ACT-171
Request No : Req-2023-2415

Unit Under Calibration Details

Measurement item : Acoustic Calibrator
Manufacturer : TENMARS
Model : ST-120
Serial Number : 211203780
ID : ENSL 22191

Class : 1
Range : 94 , 114 dB / 1000 Hz
Intrument Status : Used

Calibration Environment and Details

Temperature : (23 ±2 °C)
Humidity : (50 ± 20 %RH)
Barometric Pressure : (1013 ±10.0 hPa)
Received Date : 13 November 2023
Calibration Date : 15 November 2023
Location of Calibration : LAB 1 Acoustic
Calibration Procedure : In-house method CP-ACT-02 based on IEC 60942:2017 Electroacoustics - Sound calibrators

VERIFIED
BY DMisek DATE Nov 15, 2023

Reference Standard	Model	Serial Number	Traceable	Due Calibration
Sound Calibrator	SV 35A	58079	EEI	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 %.

Calibrated By : Mr. Noppadon Luangart
Service Calibration Engineer

Approved By : Mr. Pacit Mathavorn
Calibration Engineer Supervisor

Issue Date : 15 November 2023

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.

INNOVATIVE INSTRUMENT CALIBRATION LAB
INNOVATIVE INSTRUMENT CO., LTD. HEAD OFFICE
7 139 MOO 13, SOI SUNTINAKORN 11 TAMBON BANG KAEO
AMPHOE BANG PHLI SAMUT PRAKAN PROVINCE 10540 THAILAND
TEL : 0660-2116-5860-1 FAX: 0660-2116-7140

Certificate No : 23-ACT-171
Request No : Req-2023-2415

Sound pressure level — **Calibration Results :** Without Adjustment

Calibration Range (dB)	Without Adjustment (dB)		Adjustment (dB)		Uncertainty (± dB)	Acceptance limit Class 1 (± dB)
	Measured	Deviated value	Measured	Deviated value		
94 dB / 1000 Hz	93.99	-0.01	-	-	0.13	0.25
114 dB / 1000 Hz	114.11	0.11	-	-	0.13	0.25

Frequency of Sound pressure level

Calibration Range (Hz)	Without Adjustment		Adjustment		Uncertainty (± %)	Acceptance limit Class 1 (± %)
	Measured (Hz)	Deviated value	Measured (Hz)	Deviated value		
94 dB / 1000 Hz	1000.0	0.00	-	-	0.01	0.70
114 dB / 1000 Hz	1000.0	0.00	-	-	0.01	0.70

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

Calibration Range (Hz)	Without Adjustment Measured (%)	Adjustment Measured (%)	Uncertainty (± %)	Acceptance limit Class 1 (± %)
94 dB / 1000 Hz	0.04	-	0.40	2.5
114 dB / 1000 Hz	0.21	-	0.40	2.5

Note :

Function	Maximum-permitted Uncertainty of measurement
Sound pressure level	0.15 dB
Frequency	0.20%
Total distortion+noise	0.50%

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

End of Calibration

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-ACT-02 Rev.01 Issue date8/8/23

SGS

Meter Console Verification

Dry Gas Meter ID. : ENSS 045
Instrument Brand : Apex / Model 572
Date of Calibration : 08/10/2023
Calibrated By : MW

Wet gas meter Information

Wet gas Brand : Shinagawa
Wet gas Model : W-NK-2.5A
Wet gas S/N : 544122
Expire Date : August 30, 2025

Orifice Setting ΔH@ (mm H_2O)	Wet gas		Metering System		Time (min)	Yi	ΔH@
	V_w (L)	T_w (°C)	V_d (L)	T_m (°C)			
13	139.48	23.8	140.0	23.0	12.20	0.9924	46.852
13	139.52	23.8	140.0	23.5	12.17	0.9945	46.475
26	137.36	23.7	140.0	24.0	8.42	0.9797	45.857
26	137.48	23.6	140.0	24.0	8.40	0.9809	45.566
40	273.54	23.5	280.0	24.0	13.62	0.9748	46.563
40	273.80	23.4	280.0	24.5	13.60	0.9779	46.236
50	275.80	23.3	280.0	25.0	12.28	0.9859	46.416
50	276.14	23.3	280.0	25.0	12.32	0.9871	46.553
70	269.04	23.0	280.0	25.0	10.10	0.9610	46.150
70	268.93	22.7	280.0	26.0	10.08	0.9646	45.804
90	266.72	22.4	280.0	27.0	8.97	0.9590	47.181
90	266.66	22.3	280.0	27.0	9.02	0.9592	47.698
Average						0.9764	46.446

Remark : Yi ≤ ± 0.02 from average
Yi = 1.00 ± 0.05
ΔH@ ≤ ± 5.08 mm.H_2O from average
ΔH@ = 46.7 ± 8.4 mm.H_2O

Checked By : Nuttawat S. (Nuttawat Sirichoti)
Position : Store Manager
Date : 09/10/2023

Approved By : Thepsan Y. (Thepsan Yommana)
Position : Technical Manager
Date : 09/10/2023

VERIFIED
BY DMisek DATE Oct 26, 2023

SGS

Temperature Display Verification

Dry Gas Meter ID. : ENSS 045
Instrument Brand : Apex / Model 572
Date of Calibration : 8/10/2023
Calibrated By : MW

Temperature Simulator Information

Simulator Brand : Handy Cal
Simulator Model : CA11E
Simulator S/N : T1L1015
Expire Date : 11/07/2024

Standard Value	Instrument Display				
	Stack	Probe	Filter	Aux	Exit
300	299	300	299	298	-
200	200	200	200	200	-
150	149	150	150	150	-
100	100	101	100	101	99
50	50	50	50	51	50
0	0	0	0	0	0
Difference	0.2%	1.0	1.0	2.0	1.0

Remark : Stack ≤ ± 1.5 % Absolute
Probe ≤ ± 3.0 °C
Filter ≤ ± 3.0 °C
Aux ≤ ± 3.0 °C
Exit ≤ ± 3.0 °C

Checked By : Nuttawat S. (Nuttawat Sirichoti)
Position : Store Manager
Date : 09/10/2023

Approved By : Thepsan Y. (Thepsan Yommana)
Position : Technical Manager
Date : 09/10/2023

VERIFIED
BY DMisek DATE Oct 26, 2023

SGS (Thailand) Limited | 100 Nanglinchee Road Chongnonsee Yannawa Bangkok 10120 t +66 (0)2 678 18 13 f +66 (0)2 678 15 41 www.sgs.com
Member of the SGS Group

SGS

Manometer Verification

Dry Gas Meter ID.	: ENSS 045	**Date of Calibration**	: 8/10/2023
Instrument Brand	: Apex / Model 572	**Calibrated By**	: MW

Magnehelic gauge Information

Magnehelic Brand	: Dwyer Industries,Inc.	**Magnehelic S/N**	: R060822A1109
Magnehelic Model	: 2000-100MM	**Expire Date**	: 2/10/2024

Manometer data				
Test No.	**Manometer Referance ΔP (mm.H2O);A**	**Manometer monitoring ΔP (mm.H2O);B**	**Difference**	**Referance/Monitoring A/B**
1	2.0	2.0	0.00	1.00
2	8.0	6.4	0.40	0.93
3	10.0	10.4	0.40	0.96
4	16.0	16.6	0.60	0.96
5	20.0	20.4	0.40	0.98
Average			**0.36**	**0.97**

Remark : [Referance(Avg) / Monitoring(Avg)] must be = 0.95 to 1.05

Checked By : Nuttawat S. (Nuttawat Sirichoti)
Position : Store Manager
Date : 09/10/2023

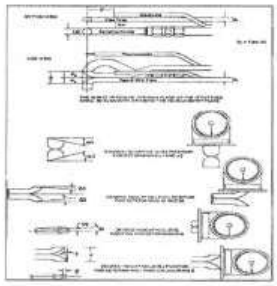
Approved By : Thepsan Y. (Thepsan Yommana)
Position : Technical Manager
Date : 09/10/2023

VERIFIED
BY OMisak DATE Oct 26,2023

SGS

Certificate of Calibration

S-Type Geometric Pitot Tube Calibration
See the Code of Federal Regulations, Title 40, Part 60, Appendix A, Method 2, Item 6



Pitot tube/Probe No. No.34/A8460

Parameter	Value	Allowable Range	Check
Assembly Level?	Y	Yes or y	PASS
Ports Damaged?	N	No or n	PASS
α1	-1.5	$-10° < \alpha1 < +10°$	PASS
α2	-1.1	$-10° < \alpha1 < +10°$	PASS
β1	0.6	$-5° < \alpha1 < +5°$	PASS
β2	-0.4	$-5° < \alpha1 < +5°$	PASS
γ	1.8	N/A	-
θ	0.6	N/A	-
D_t	0.375	0.188" to 0.375"	PASS
A	0.911024	$2.1D_t \leq A \leq 3.00_t$	PASS
$A/2D_t$	1.214698	$1.05 \leq P_a/D_t \times 1.5$	PASS
Z = A tan γ	0.02863	$Z \leq 0.125"$	PASS
W = A tan θ	0.009541	$W \leq 0.031"$	PASS

I certify that pitot tube/probe No.34/A8460 meets or exceeds all specifications, criteria and/or applicable design features and is hereby assigned a pitot tube certification factor of 0.84. See 40 CFR Pt. 60, App A, EPA Method 2

Standard Device

Device Name	Digital Inclinometer
Manufacturer	BASELINE
Model	12-1057
ID No.	QC-1824

Expiration data 18-Dec-24
ENSS No. ENSS 22159

Certified by Nawat C.
Date 8-Jan-24

Approved by
Date 8 Jan 24

VERIFIED
BY DATE 8 Jan 24

MIT MIRACLE INTERNATIONAL TECHNOLOGY CO.,LTD
314 Bangwaek Rd. Bangpoi Bangkae Bangkok 10160
Tel.: 0-2865-4647-8 Fax: 0-2865-4649 http://www.mit.in.th

CALIBRATION CERTIFICATE

Certificate No. : L202404233-0001
Date Issued : 29-Apr-24

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

Equipment : DryCal (High Flow)

Manufacturer : Defender
Model : 530-H
Serial No. : 118998
ID No./Tag No. : ENWP 071
Date Received : 23-Apr-24
Date Calibrated : 26-Apr-24

Calibrated by : Mr. Jame Khaothong

Calibration Method or Calibration Procedure Used

In-house method : CP-24 by comparison against Lamina flow element flow calibrator.
In-house method : CP-34 by comparison against mass flow calibrator.

This certificate is traceable to national standards, which realize the units of measurement according to the International System of Units (SI).

Result of Calibration

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

This certificate may not be reproduced other than in full except with the prior written approval of the Miracle International Technology Company Limited.

Approved by: Sarayuth T.
(Mr. Sarayuth Tochua)

CERTIFIED MIT

Certificate No. : L202404233-0001

Note : The actual flow rate is determined by the equation :

$$Q_{Meas} = Q_{Ref} \times \frac{P_{Ref}}{P_{Meas}} \times \frac{T_{Meas}}{T_{Ref}}$$

; Q = Flow rate
; P = Absolute pressure
; T = Absolute temperature
; Subscript "Meas" = Measurement condition
; Subscript "Ref" = Reference condition

Condition As-Received : Used Item

The measurment results and statements of conformity with specification only relate to the item calibrated.

Traceability of Certificate :

The International System of Units (SI) through

MIT Calibration Certificate No. L202309114-0011 for Mass Flow Calibrator (2000 SCCM) Serial No. 96093001W, Due 10-Sep-24

MIT Calibration Certificate No. L202309114-0012 for Mass Flow Calibrator (20 SCM) Serial No. 96093001W, Due 11-Sep-24

MIT Calibration Certificate No. L202403007-0015 for Laminar Flow Element Air Flow Calibrator (Air Flow) Serial No. 3096, Due 12-Mar-25

End of Certificate

Certificate No. : L202404233-0001

Environment : Ambient temperature : (23 ± 2) °C
Relative humidity : (50 ± 15) % RH

Capacity Range : 30 l/min

Calibration Media : Air

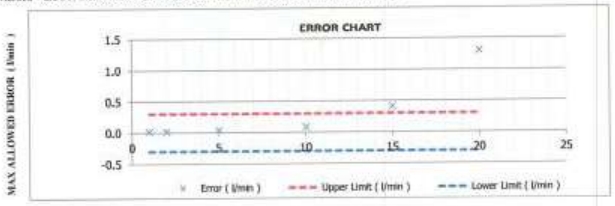
Type : Mass Flowmeter

Unit Under Calibration Reference Condition : At atmospheric pressure and room temperature condition

Temperature (°C)	Pressure (kPa)	UUC Reading (l/min)	STD Reading (l/min)	Error (l/min)	Uncertainty (± l/min)
24.22	100.87	1.0037	0.9851	0.0186	0.026
23.06	101.55	2.0010	1.9833	0.0177	0.052
22.68	102.19	5.0001	4.959	0.0411	0.15
22.35	105.09	10.024	9.936	0.088	0.30
22.46	109.52	15.010	14.596	0.414	0.19
23.00	115.80	20.007	18.7	1.307	0.25

Error = Unit Under Calibration - Standard

Marked * are not included in the NSC-ONSC accreditation schedule for our laboratory.



MIRACLE INTERNATIONAL TECHNOLOGY CO.,LTD
214 Bangwaek Rd. Bangpai Bangkae Bangkok 10160
Tel./ 0-2865-4647-8 Fax: 0-2865-4649 http://www.mit.in.th

CALIBRATION CERTIFICATE

Certificate No. : L202401305-0002
Date Issued : 16-Feb-24

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

Equipment : DryCal (Low Flow)

Manufacturer : Bios
Model : Defender 530-L
Serial No. : 127509
ID No./Tag No. : ENWP 12228
Date Received : 25-Jan-24
Date Calibrated : 10-Feb-24

Calibrated by : Mr. Jame Khaothong

Calibration Method or Calibration Procedure Used

In-house method : CP-34 by comparison against mass flow calibrator.

This certificate is traceable to national standards, which realize the units of measurement according to the International System of Units (SI).

Result of Calibration

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

This certificate may not be reproduced other than in full except with the prior written approval of the Miracle International Technology Company Limited.

Approved by: Sarayuth T.
(Mr. Sarayuth Tochua)

CERTIFIED MIT

Certificate No. : L202401305-0002

Environment : Ambient temperature : (23 ± 2) °C
Relative humidity : (50 ± 15) % RH

Capacity Range : 500 ml/min

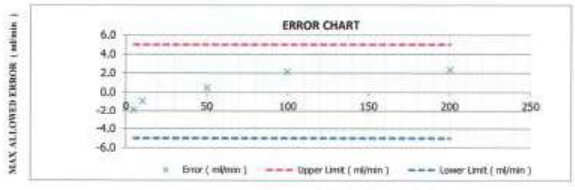
Calibration Media : Air

Type : Mass Flowmeter

Unit Under Calibration Reference Condition : At atmospheric pressure and room temperature condition

Temperature (°C)	Pressure (kPa)	UUC Reading (ml/min)	STD Reading (ml/min)	Error (ml/min)	Uncertainty (± ml/min)
22.87	101.25	5.0351	6.923	-1.8879	0.14
22.86	101.27	10.238	11.147	-0.909	0.13
22.88	101.41	50.237	49.77	0.467	1.7
22.72	101.55	99.69	97.55	2.14	1.5
22.72	101.87	200.27	197.92	2.35	1.6

Error = Unit Under Calibration - Standard



Certificate No. : L202401305-0002

Note : The actual flow rate is determined by the equation :

$$Q_{Meas} = Q_{Ref} \times \frac{P_{Ref}}{P_{Meas}} \times \frac{T_{Meas}}{T_{Ref}}$$

; Q = Flow rate
; P = Absolute pressure
; T = Absolute temperature
; Subscript "Meas" = Measurement condition
; Subscript "Ref" = Reference condition

Condition As-Received : Used Item

The measurement results and statements of conformity with specification only relate to the item calibrated.

Traceability of Certificate :

The International System of Units (SI) through
NIMT Calibration Certificate No. MW-0013-22 for Mass Flow Calibrator (20 SCCM) Serial No. G500971G20, Due 22-Feb-24
MIT Calibration Certificate No. L202210258-007 for Mass Flow Calibrator (200 SCCM) Serial No. 96093001W, Due 07-Nov-24

End of Certificate

MIRACLE INTERNATIONAL TECHNOLOGY CO.,LTD
214 Bangwalk Rd. Bangrak Bangkae Bangkok 10160
Tel.: 0-2865-4647-8 Fax: 0-2865-4649 http://www.mit.in.th

CALIBRATION CERTIFICATE

Certificate No. : L202402217-0002
Date Issued : 04-Mar-24

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

Equipment : DryCal

Manufacturer : MESA LABS
Model : DEFENDER 530-L
Serial No. : 137758
ID No./Tag No. : ENWP 15147
Date Received : 20-Feb-24
Date Calibrated : 01-Mar-24

Calibrated by : Mr. Jame Khaothong

Calibration Method or Calibration Procedure Used

In-house method : CP-34 by comparison against mass flow calibrator.

This certificate is traceable to national standards, which realize the units of measurement according to the International System of Units (SI).

Result of Calibration

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

This certificate may not be reproduced other than in full except with the prior written approval of the Miracle International Technology Company Limited.

Approved by
(Mr. Sarayuth Tochua)

CERTIFIED MIT

Note : The actual flow rate is determined by the equation :

$$Q_{Meas} = Q_{Ref} \times \frac{P_{Ref}}{P_{Meas}} \times \frac{T_{Meas}}{T_{Ref}}$$

; Q = Flow rate
; P = Absolute pressure
; T = Absolute temperature
; Subscript "Meas" = Measurement condition
; Subscript "Ref" = Reference condition

Condition As-Received : Used Item

The measurment results and statements of conformity with specification only relate to the item calibrated.

Traceability of Certificate :

The International System of Units (SI) through

MIT Calibration Certificate No. L202210258-007 for Mass Flow Calibrator (200 SCCM) Serial No. 96093001W, Due 07-Nov-24

MIT Calibration Certificate No. L202309114-0011 for Mass Flow Calibrator (2000 SCCM) Serial No. 96093001W, Due 10-Sep-24

End of Certificate

Environment : Ambient temperature : (23 ± 2) °C
Relative humidity : (50 ± 15) % RH
Capacity Range : 500 ml/min
Calibration Media : Air
Type : Mass Flowmeter
Unit Under Calibration Reference Condition : At atmospheric pressure and room temperature condition

Temperature (°C)	Pressure (kPa)	UUC Reading (ml/min)	STD Reading (ml/min)	Error (ml/min)	Uncertainty (± ml/min)
23.37	101.02	5.1125	5.431	-0.3185	0.19
23.24	101.04	10.117	10.749	-0.632	0.18
23.17	101.14	50.153	55.04	-4.887	0.77
23.28	101.28	100.32	110.42	-10.10	0.91
23.19	101.08	250.78	244.8	5.98	2.6

Error = Unit Under Calibration - Standard

