

ภาคผนวก ง  
เอกสารสอบเทียบเครื่องมือ



List of Instruments Certification for Air & Noise Quality Analysis

No.	Instrument/Equipment	Parameter	Manufacturer	Model/Serial No.	Calibrator	Certification No.	Date of Calibration	Due date of Calibration	Remark
Ambient									
1	Orifice Transfer Standard Calibrator	Total Suspended Particulate (TSP)	Tisch Environmental,Inc.	TE-5025A 3393	Jirantee Associates Co., Ltd.	COF-041-68	30 Sep 25	29 Sep 26	-
2	U-Tube Manometer	Total Suspended Particulate (TSP)	Dwyer	1221-36-W/M -	Technology Promotion Association (Thailand-Japan)	25P1541	24 Apr 25	23 Apr 26	-
3	Aneroid Barometer	Total Suspended Particulate (TSP)	Barigo, Germany	-	Technology Promotion Association (Thailand-Japan)	25P1379	17 Apr 25	16 Apr 26	-
4	Dial Thermo-Hygrometer	Total Suspended Particulate (TSP)	Barigo, Germany	-	Technology Promotion Association (Thailand-Japan)	25H812	10 Apr 25	9 Apr 26	-

List of Instruments Certification for Air & Noise Quality Analysis

No.	Instrument/Equipment	Parameter	Manufacturer	Model/Serial No.	Calibrator	Certification No.	Date of Calibration	Due date of Calibration	Remark
Workplace									
1	Primary Flow Calibrator	Calibrate personal pump	TSI,Inc	4146 41461922008	Innovative Instrument Co., Ltd.	25-AFM-013	15 Jan 25	14 Jan 26	-
2	Aneroid Barometer	Total Dust	Barigo, Germany	-	Technology Promotion Association (Thailand-Japan)	25P1359	17 Apr 25	16 Apr 26	-
3	Digital Thermo - Hygrometer	Total Dust	Digicon	TH-02A 435031145	Technology Promotion Association (Thailand-Japan)	25H1369	8 Jul 25	7 Jul 26	-

List of Instruments Certification for Water Quality Analysis

No.	Instrument/Equipment	Parameter	Manufacturer	Model/Serial No.	Calibrator	Certification No.	Date of Calibration	Due date of Calibration	Remark
Water									
1	pH Meter	pH	Horiba	LAQUA-PH210 HA1M0043	Technology Promotion Association (Thailand-Japan)	25CH263	26 Feb 25	25 Feb 26	-

## CERTIFICATE OF CALIBRATION

Certificate No. : COF-043-68

Page 1 of 2 Pages

### MEASUREMENT ITEM

: Top Load Orifice

### MANUFACTURER

: TSCN

### MODEL/TYPE

: TE-5025A

### SERIAL NUMBER

: 3393

### ID NUMBER

: UAE-EFM.064/2560

### CONDITION AS-RECEIVED

: Used item

### CUSTOMER

: United Analyst and Engineering Consultant Co., Ltd.

: 81 Soi Udomsuk 41, Sukhumvit Road, Bangkok, Phrakhanong,

Bangkok 10260

### RECEIVED DATE

: 29 Aug 2025

### MEASUREMENT DATE

: 30 Sep 2025

### ISSUE DATE

: 30 Sep 2025

### ENVIRONMENTAL CONDITIONS:

Ambient condition in the laboratory are as follow:

Temperature : 23.0 ± 3.0 °C

Relative Humidity : 55.0 ± 15.0 %RH

Atmospheric Pressure : 1010 ± 10 hPa

### CALIBRATION CONDITION:

Preconditioning : 24 hours at ambient conditions.

Measurement Condition : The average values during measurement are 23.0 °C and 49.8 %RH.

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

### TABULATION OF RESULTS:

The table on next page give the measured values.

### Calibration procedure:

The Orifice gas flow device was calibrated against Standard Rotary Displacement Meter (Roots Meter) Model GGS/IMC/W3-dp. The WI-CL-004 was used as a calibration guideline.

### Traceability:

This certificate provides a "traceability of the measurement to recognized the national standards and to realization of the international system of units (SI) through the NIMT (National Metrology Institute of Thailand) via Certificate number: VM66016-25.

### Uncertainty of Measurement:

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

Table 1: The results of  $Q$  Standard calibration data

Plate	Flow rate $m^3/min$	Pressure [Pa] mmHg	Temperature [Ta] °C	Temperature [Tm] °C	Ap_meter mmHg	Ap_Orifice inH <sub>2</sub> O	Y	Standard Flow [Q <sub>s</sub> ] $m^3/min$
1	0.697	756.886	23.24	22.61	55.851	1.699	1.305	0.648
2	0.994	756.950	23.77	23.29	60.934	3.434	1.853	0.916
3	1.116	756.988	23.90	23.42	42.205	4.570	2.137	1.055
4	1.171	756.994	23.96	23.44	31.000	5.189	2.277	1.124
5	1.421	756.980	24.08	23.56	30.617	7.685	2.771	1.364

Slope (m):

2.04684

Intercept (b):

-0.02236

Correlation coefficient (r):

0.99989

Uncertainty (k=2):

0.015  $m^3/min$

Table 2: The results of  $Q$  actual calibration data

Plate	Flow rate $m^3/min$	Pressure [Pa] mmHg	Temperature [Ta] °C	Temperature [Tm] °C	Ap_meter mmHg	Ap_Orifice inH <sub>2</sub> O	Y	Standard Flow [Q <sub>s</sub> ] $m^3/min$
1	0.697	756.886	23.24	22.61	55.851	1.699	0.816	0.647
2	0.994	756.950	23.77	23.29	60.934	3.434	1.161	0.916
3	1.116	756.988	23.90	23.42	42.205	4.570	1.339	1.055
4	1.171	756.994	23.96	23.44	31.000	5.189	1.427	1.125
5	1.421	756.980	24.08	23.56	30.617	7.685	1.737	1.365

Slope (m):

1.28197

Intercept (b):

-0.01396

Correlation coefficient (r):

0.99989

Uncertainty (k=2):

0.015  $m^3/min$

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

Calibrated by:

☒ Mr. Sorwatt Thachalad

☐ Miss Jitraporn Lertsomphol



Approved signatory:

*[Signature]*

Mr. Parinya Booncharoen  
Calibration Department Manager



THIS CERTIFICATE OF CALIBRATION MAY NOT BE REPRODUCED EXCEPT IN FULL UNLESS PERMISSION FOR REPRODUCTION IS GRANTED IN WRITING FROM THE LABORATORY

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TECHNOLOGY PROMOTION ASSOCIATION (THAILAND-JAPAN)  
CORPORATE SERVICES 3: EQUIPMENT CALIBRATION AND TESTING SERVICES  
5344 PATTANAKARN ROAD SOI 18, SUANLUANG, SUANLUANG, BANGKOK 10250  
TEL. 0-2717-3000-24 FAX. 0-2719-9484

## Certificate of Calibration

Certificate No. : 25P1541

Page : 1 of 2

Equipment :

U Tube Manometer

Manufacturer:

Dwyer

Model :

1221-36-WIM

Serial No.:

-

ID No.:

UAE-EFM.077/2566

Condition As-Received:

Used Item

Received Date:

04 April 2025

Calibration Date:

24 April 2025

Reference:

2504-0192WSC

Submitted by:

United Analyst and Engineering Consultant Co.,Ltd.

Ambient Temperature:

( 23 ± 2 ) °C

Relative Humidity:

( 50 ± 15 ) %

Atmospheric Pressure:

1005 mbar

81 Soi Udomsuk 41, Sukhumvit Road, Bangkok,

Phrakhanong, Bangkok 10260

Procedure used:

The calibration was conducted by direct comparison method against Pressure Measuring Instruments Standard according to calibration procedure CP-P04, using " DKD-R 6-1 ; Calibration of Pressure Gauges " as a guidelines.

### Condition of this result of calibration

1.Reference standards instruments :

Instrument	Model	Serial No.	Certificate No.	Due Date
1) Pressure Calibrator	PC106P	1189	MP-0218-24	24 Sep 2025

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

3.Scale and conversion factor is 1 kPa = 4.0146293 inH<sub>2</sub>O

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

5.This instrument was calibrated by applied pressure to high-port (+) side and low-port (-) side open to atmospheric pressure.

6.This instrument was installed in vertical orientation and top of the pressure port was used as the reference level.

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

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

-National Institute of Metrology (Thailand), NSC-ONSC Accredited No. Calibration 0144

Calibrated by : Suksan Khankae

Issue Date : 28 April 2025

Approved Signatory :

*[Signature]*

[ ] Phalinee Prabsapal

[ ] Sura Suwannasri

[x] Attapol Panurach

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Result of calibration: Without adjustment

Function: Pressure Measurement

Increasing Pressure

Range: 0 inH<sub>2</sub>O to 36 inH<sub>2</sub>O

Scale Interval: 0.1 inH<sub>2</sub>O ( The Second Estimate )

Applied Pressure	High-port side	UUC Indication Low-port side	$\Delta p$	Error
0.00	0.00	0.00	0.00	0.00
2.05	1.00	-1.00	2.00	-0.05
4.06	2.00	-2.00	4.00	-0.05
6.05	3.00	-3.00	6.00	-0.05
8.03	4.00	-4.00	8.00	-0.03
9.98	5.00	-5.00	10.00	0.02
11.97	6.00	-6.00	12.00	0.03
13.97	7.00	-7.00	14.00	0.03
15.96	8.00	-8.00	16.00	0.04
17.95	9.00	-9.00	18.00	0.05
19.93	10.00	-10.00	20.00	0.07
21.93	11.00	-11.00	22.00	0.07
23.89	12.00	-12.00	24.00	0.11
25.89	13.00	-13.00	26.00	0.11
27.85	14.00	-14.00	28.00	0.15
29.85	15.00	-15.00	30.00	0.15
31.85	16.00	-16.00	32.00	0.15
33.85	17.00	-17.00	34.00	0.15
35.85	18.00	-18.00	36.00	0.15

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

\*  $\Delta p$  = High-port side - Low-port side

\* UUC = Unit Under Calibration

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

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## Certificate of Calibration

Certificate No.: 25P1379  
Page: 1 of 2

Equipment : Aneroid Barometer  
Manufacturer: Barigo  
Model : -  
Serial No.: -  
ID No.: UAE.ANV.121/2550

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except with the prior written approval of the head of  
Corporate Services 3: Equipment Calibration and Testing Services.

Condition As-Received: Used Item  
Received Date: 04 April 2025  
Calibration Date: 17 April 2025

Reference: 2504-0196WSC  
Ambient Temperature: ( 23 ± 2 ) °C  
Relative Humidity: ( 50 ± 15 ) %  
Atmospheric Pressure: 1005 mbar  
Submitted by: United Analyst and Engineering Consultant Co.,Ltd.  
81 Soi Udomsuk 41, Sukhumvit Road, Bangkok,  
Phrakhanong, Bangkok 10260

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

### Condition of this result of calibration

1.Reference standards instruments :

Instrument	Model	Serial No.	Certificate No.	Due Date
1) Standard Barometer	DPI142	1422505046	MP-0133-24	15 May 2025
2.This instrument was installed in vertical orientation and center of the dial was used as the reference level.				
3.This result of calibration was made on requested at the point specified by customer.				
4.This result of calibration instrument was in absolute pressure.				
5.This instrument was used clean air as pressure media.				
6.The certificate is valid only to the item calibrated on date and place of calibration.				
7.This Certification is traceable to the International System of Unit maintained through:-				
-National Institute of Metrology Thailand (NIMT)				

Calibrated by : Kaerpon Salivichai  
Issue Date : 21 April 2025

Approved Signatory : Atapol P.  
[ ] Phalinee Prabpaipal  
[ ] Sura Suwannasri  
[✓] Atapol Panurach

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Result of calibration:- Without adjustment

Range: 960 hPa to 1070 hPa

Function:- Absolute Pressure Measurement

Scale Interval: 1 hPa ( The Fifth Estimate )

Increasing Pressure

Applied Pressure (hPa)	959.71	971.22	982.18	991.71	1003.10	1006.94	1013.02	1023.08	1034.17	1068.92
UUC* Indication (hPa)	960.0	970.0	980.0	990.0	1000.0	1005.0	1010.0	1020.0	1030.0	1060.0
Error (hPa)	0.29	-1.22	-2.18	-1.71	-3.10	-1.94	-3.02	-3.08	-4.17	-8.92

Decreasing Pressure

Applied Pressure (hPa)	1068.95	1033.45	1022.77	1012.49	1007.16	1002.58	992.32	982.17	970.86	959.47
UUC* Indication (hPa)	1060.0	1030.0	1020.0	1010.0	1005.0	1000.0	990.0	980.0	970.0	960.0
Error (hPa)	-8.95	-3.45	-2.77	-2.49	-2.16	-2.58	-2.32	-2.17	-0.86	0.53

The uncertainty of measurement was ± 0.33 hPa

\* UUC = Unit Under Calibration

The reported uncertainty of measurement was based on a standard uncertainty multiplied

by a coverage factor  $k = 2$ , providing a level of confidence of approximately 95 %.

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## Certificate of Calibration

Certificate No.: 25H812  
Page: 1 of 2

Equipment : Dial Thermo-Hygrometer  
Manufacturer: Barigo  
Model : -  
Serial No.: -  
ID No.: UAE.ANV.132/2550

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except with the prior written approval of the head of  
Corporate Services 3: Equipment Calibration and Testing Services.

Condition As-Received: Used Item  
Received Date: 04 April 2025  
Calibration Date: 10 April 2025  
to 17 April 2025

Reference: 2504-0193WSC  
Ambient Temperature: ( 25 ± 3 ) °C  
Relative Humidity: ( 50 ± 20 ) %  
Submitted by: United Analyst and Engineering Consultant Co.,Ltd.  
81 Soi Udomsuk 41, Sukhumvit Road, Bangkok,  
Phrakhanong, Bangkok 10260

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

### Condition of this result of calibration

1.Reference standards instruments :

Instrument	Model	Serial No.	Certificate No.	Due Date
1) Dew Point Hygrometer	Optidew 401	164756	TH-0005-25	05 Feb 2026
2) Handheld Thermometer With Sensor	1523	5717096	2411241	18 Nov 2025

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

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

-National Institute of Metrology (Thailand), NSC-ONSC Accredited No. Calibration 0144

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

Result of Calibration:- Without Adjustment  
Function: Humidity Measurement.

Reference Temperature (°C)	Standard Humidity (%R.H.)	UUC* Reading (%R.H.)	Correction (%R.H.)	Uncertainty of Measurement (±%R.H.)
25.0	40.1	42	-1.9	1.7
25.0	60.0	60	0.0	1.8
25.0	80.0	76	4.0	1.9

Result of Calibration:- Without Adjustment  
Function: Temperature Measurement.

Standard Temperature (°C)	UUC* Reading (°C)	Correction (°C)	Uncertainty of Measurement (±°C)
20.001	21.0	-0.999	0.72
24.987	25.0	-0.013	0.72
30.021	30.0	0.021	0.72
34.964	34.0	0.964	0.72
40.032	39.0	1.032	0.72

UUC\* : Unit Under Calibration

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

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Calibrated by : Somchai Dumwor  
Issue Date : 18 April 2025

Approved Signatory : Viporn  
[ ] Chakrit Waewwanjua  
[ ] Pornthippa Tameyakul  
[✓] Viporn Tantayawutti

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## Certificate of Calibration

### Customer

Name : UNITED ANALYST AND ENGINEERING CONSULTANT CO., LTD.  
Address : 81 Soi Udomsuk 41, Sukhumvit Road, Bangchak, Prakanong,  
Bangkok 10260

Certificate No : 25-AFM-013

Request No : Req-2024-2865

### Unit Under Calibration Details

Measurement Item : Air Flow Meter  
Manufacturer : TSI  
Model : 4146  
Serial Number : 41461922008  
ID : UAE.FM.224/2562  
Location of Calibration : LAB 4 AIR VELOCITY METER  
Calibration Environment and Details  
Temperature : 23 °C ± 3 °C  
Humidity : 55 %RH ± 20 %RH  
Barometric Pressure : 1013 hPa ± 10 hPa  
Received Date : 20 December 2024  
Calibration Date : 15 January 2025  
Calibration Procedure : In-house method CP-AFM-01 by Comparison technique with Standard Primary Flow Calibrator


Reference Standard	Model	Serial Number	Traceable	Due Calibration
Air Flow Meter	Gilibrator 3 Low flow	18501010006	Sensidyne	6 August 2025
Air Flow Meter	Gilibrator 3 Standard flow	19031011003	Sensidyne	2 August 2025
Temperature meter	GT 11	08000057	Qreborn	1 March 2025
Pressure meter	CPG2400	41000KDU/651882	TPA	21 October 2025


### Traceability :

This Certificate is traceable to SI Unit through Sensidyne A2LA Accreditation No. 3943.01

### Note :

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

Calibration By :   
Mr. Noppadon Luangart  
Service Calibration Engineer

Approved By :   
Mr. Pacit Mathavorn  
Calibration Engineer Supervisor  
Issue Date : 15 January 2025

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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-AFM-01 Rev.04 Issue date 17/6/24

Certificate No : 25-AFM-013

Request No : Req-2024-2865

### Decision Rule for Statements of Conformity

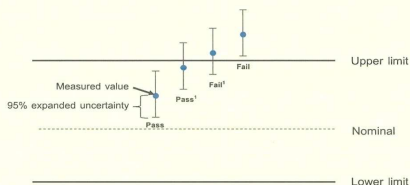
The standard decision rule employed for the statements of conformity to each calibration result will be applied using ILAC-G8:09/2019; Guidelines on the Reporting of Compliance with Specification as following Fig. and statements

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

Pass<sup>1</sup> = The measurement result was within the limit. However, a portion of the expanded uncertainty of measurement at 95% exceeds the limit.

Fail<sup>1</sup> = 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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FM-708-AFM-01 Rev.04 Issue date 17/6/24

Certificate No : 25-AFM-013

Request No : Req-2024-2865

### Result of Calibration : Without Adjustment

Temperature (°C)	Pressure (kPa)	STD (l/min)	UUC (l/min)	Error (l/min)	Uncertainty (l/min)	MPE (l/min)	Result
22.00	101.49	0.021	0.020	-0.001	0.0013	0.005	N/A
22.00	101.48	0.050	0.050	0.000	0.0033	0.005	N/A
22.00	101.49	0.100	0.100	0.000	0.0028	0.005	N/A
22.00	101.49	0.199	0.200	0.000	0.0056	0.005	N/A
22.00	101.50	0.501	0.500	0.0	0.0073	0.010	N/A
22.10	101.51	1.004	1.000	0.0	0.015	0.020	N/A
22.50	101.52	1.712	1.700	0.0	0.025	0.034	N/A
22.60	101.53	2.021	2.000	0.0	0.029	0.040	N/A
22.70	101.89	3.034	3.000	-0.03	0.044	0.060	N/A
22.80	102.00	4.032	4.000	-0.03	0.059	0.080	N/A
23.10	102.15	5.071	5.000	-0.07	0.073	0.100	N/A

### Note

STD : Standard UUC : Unit Under Calibration

- UUC Reference Condition : 21.1 °C, 101.3 kPa, Air

- Flow Rate was corrected for non-standard operating condition by using equation :

$$Q_{meas} = Q_{ref} \times \frac{P_{ref}}{P} \times \frac{T_{meas}}{T_{ref}}$$

where Q = Flow Rate P = Absolute Pressure T = Absolute Temperature  
Meas = Measurement Condition ref = Standard Condition

\* Indicates non accredited

MPE = Maximum Permissible Error (Specified in Manufacturer's Specifications)

N/A = Not Available, Customer does not require a statement of conformity.

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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-AFM-01 Rev.04 Issue date 17/6/24



TECHNOLOGY PROMOTION ASSOCIATION (THAILAND-JAPAN)  
CORPORATE SERVICES 3: EQUIPMENT CALIBRATION AND TESTING SERVICES  
53/44 PATTANAKARN ROAD SOI 18, SUANLUANG, SUANLUANG, BANGKOK 10250  
TEL. 0-2717-3000-24 FAX. 0-2719-9484



## Certificate of Calibration

Certificate No. : 25P1359

Page : 1 of 2

Equipment : Aneroid Barometer  
Manufacturer : Barigo  
Model : 111MS  
Serial No. : -  
ID No. : UAE.EMA2.067/2552

Condition As-Received: Used Item

Received Date: 10 April 2025

Calibration Date: 17 April 2025

Reference: 2504-0315WSC

Ambient Temperature: ( 23 ± 2 ) °C

Relative Humidity: ( 50 ± 15 ) %

Atmospheric Pressure: 1009 mbar

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

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

Procedure used: The calibration was conducted by direct comparison method against Pressure Measuring Instruments Standard according to calibration procedure CP-P10, using " DKD-R 8-1 ; Calibration of Pressure Gauges " as a guidelines.

### Condition of this result of calibration

1.Reference standards instruments :

Instrument	Model	Serial No.	Certificate No.	Due Date
1) Standard Barometer	DPI142	1422505046	MP-0133-24	15 May 2025
2.This instrument was installed in vertical orientation and center of the dial was used as the reference level.				
3.This result of calibration was made on requested at the point specified by customer.				
4.Scale and conversion factor is 1 kPa = 7.50062 mmHg				
5.This result of calibration instrument was in absolute pressure.				
6.This instrument was used clean air as pressure media.				
7.The certificate is valid only to the item calibrated on date and place of calibration.				
8.This Certification is traceable to the International System of Unit maintained through:-				
-National Institute of Metrology Thailand (NIMT)				

Calibrated by : Kaerpon Salivachai  
Issue Date : 21 April 2025

Approved Signatory :   
[ ] Phalinee Prabpaipal  
[ ] Sura Suwananasi  
[v] Attapol Panurach

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Cert.No.: 25P1359  
Page: 2 of 2

Result of calibration:- Without adjustment  
Function:- Absolute Pressure Measurement

Range: 720 mmHg to 780 mmHg  
Scale Interval: 1 mmHg ( The Fifth Estimate )

**Increasing Pressure**

Applied Pressure (mmHg)	717.92	728.95	739.74	750.28	761.55	773.52	784.47
UUC* Indication (mmHg)	720.0	730.0	740.0	750.0	760.0	770.0	780.0
Error (mmHg)	2.08	1.05	0.26	-0.28	-1.55	-3.52	-4.47

**Decreasing Pressure**

Applied Pressure (mmHg)	784.47	773.53	761.51	750.35	739.81	729.05	718.10
UUC* Indication (mmHg)	780.0	770.0	760.0	750.0	740.0	730.0	720.0
Error (mmHg)	-4.47	-3.53	-1.51	-0.35	0.19	0.95	1.90

The uncertainty of measurement was  $\pm 0.24$  mmHg  
\* UUC = Unit Under Calibration

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

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



## Certificate of Calibration

Certificate No.: 25H1369  
Page: 1 of 2

Equipment : Digital Thermo-Hygrometer

Manufacturer : Digicon

Model : TH-02A

Serial No.: 435031145

ID No.: UAE.EFM.003/2567

Condition As-Received: Used Item

Received Date: 04 July 2025

Calibration Date: 08 July 2025

Reference: 2507-0219WSC

Ambient Temperature: ( 25  $\pm$  3 ) °C

Relative Humidity: ( 50  $\pm$  20 ) %

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

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

Procedure used: Calibration were conducted using in-house calibration procedure CP-H03 according to comparison with standard chilled mirror sensor for humidity measurement function and comparison with standard temperature probe for temperature measurement function into humidity / temperature chamber.

**Condition of this result of calibration**

1.Reference standards instruments :

Instrument	Model	Serial No.	Certificate No.	Due Date
1) Dew Point Hygrometer	Optidew 401	184756	TH-0005-25	05 Feb 2026
2) Handheld Thermometer With Sensor	1523	5717096	2411241	18 Nov 2025

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

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

-National Institute of Metrology (Thailand), NSC-ONSC Accredited No. Calibration 0144

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

Calibrated by : Somchai Dumvor  
Issue Date : 21 July 2025

Approved Signatory :   
( ) Chakrit Waewwanjua  
( ) Pornthippa Tameyakul  
(✓) Viporn Tantayawutti

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Cert. No.: 25H1369  
Page.: 2 of 2

Result of Calibration:- Without Adjustment  
Function: Humidity Measurement.

Reference Temperature (°C)	Standard Humidity (%R.H.)	UUC* Reading (%R.H.)	Correction (%R.H.)	Uncertainty of Measurement (±%R.H.)
25.0	40.1	39	1.1	1.3
25.0	50.1	48	2.1	1.6
25.0	60.0	57	3.0	1.6
25.0	70.2	67	3.2	1.6

Result of Calibration:- Without Adjustment  
Function: Temperature Measurement.

Standard Temperature (°C)	UUC* Reading (°C)	Correction (°C)	Uncertainty of Measurement (±°C)
19.953	20.4	-0.447	0.42
25.001	25.4	-0.399	0.42
30.043	30.3	-0.257	0.42
40.023	40.0	0.023	0.42

UUC\* : Unit Under Calibration

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

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



## Certificate of Calibration

Cert.No.: 25CH263  
Page.: 1 of 3

Equipment : pH Meter

Manufacturer : Horiba

Model : LAQUA-PH210

Serial No. : HA1M0043

ID No. : UAE.EFM.013/2565(EFM.pH.03/65)

Condition As-Received: Used Item

Received Date : 25 February 2025

Calibration Date : 26 to 28 February 2025

Reference : 2502-0783WSC-3

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

Ambient Temperature : (25  $\pm$  2.5) °C

Relative Humidity : (50  $\pm$  15) %

Calibration Procedure :  
In - house method :  
- CP-CH5 by direct measurement with DC voltage standard and direct measurement with certified reference material (CRM)  
- CP-CH8 by comparison with temperature standard

Calibrated by : Warakorn Lernagatrakul

Approved by :   
Approved Signatory

( ) Chakrit Waewwanjua  
( ) Ponpan Paipim  
(✓) Sathip Meangmai

Issue Date : 28 February 2025

The Uncertainties are for a confidence probability of approximately 95%

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Cert.No.: 25CH263  
Page.: 2 of 3

#### Condition of this calibration result

##### 1. Reference Standard Instrument

Instrument	Serial No.	ID No.	Cert. No.	Due Date
1) Document Process Calibrator	54030049	130RC116	24E2759	25 Aug 2025
2) Ref. Standard Thermometer	4982054	110RC044	24I757	14 July 2025

- This Certification is traceable to SI Through Technology Promotion Association (Thailand - Japan)

2. Certified Reference Materials : The measurement results are traceable to SI through Hach Lenge GmbH Ltd.,  
Deutsche Akkreditierungsstelle, Accredited No.D-RM-15184-01-00  
: The measurement results are traceable to SI through CPA chem Ltd.,  
ANSI-ASQ National Accreditation Board, Accredited No. AR-1835

Buffer Solution	Manufacturer	Lot No.	Exp. date
pH 4.007	CPA chem	1066665	18 Jan 2027
pH 6.999	Hach Lenge GmbH	C03220	29 Oct 2026
pH 10.010	CPA chem	1066669	18 Jan 2026

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

#### Calibration Results

##### Function : mV Measurement

##### Performing standard curve by Document Process Calibrator at pH (4,7)(7,10)

Unit Under Calibration	Nominal Value	Standard Voltage Input	Actual Reading		Uncertainty of Measurement ( $\pm$ mV)	Coverage factor <i>k</i>
	pH	mV	mV	pH		
pH Meter S/N.: HA1M0043	4.00	177.48	177.4	4.01	0.058	2.00
	7.00	0.00	-0.1	7.00	0.058	2.00
	7.00	0.00	-0.1	7.00	0.058	2.00
	10.00	-177.48	-177.6	10.01	0.058	2.00

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Cert.No.: 25CH263  
Page.: 3 of 3

#### Calibration Results

##### Function : pH Measurement

##### Performing three buffers standard curve by using buffer nominal pH (4,7)(7,10)

Unit Under Calibration	Standard pH Buffer Solution	Actual pH Reading	Actual mV Reading (mV)	Uncertainty of pH Measurement ( $\pm$ )	Coverage factor <i>k</i>
pH Electrode S/N.: 992H0385	4.007	4.01	147.9	0.0085	2.05
	6.999	7.00	-24.3	0.0092	2.00
	6.999	7.01	-24.4	0.0085	2.00
	10.010	10.01	-197.8	0.0092	2.00

##### Function : Temperature Measurement

##### ( $^{\circ}$ ) Without adjustment

This equipment was connected with Temperature Probe;

- Model : 9652

- Serial No. : 992H0385

Dimension of probe

- Length : 110 mm.

- Diameter : 16 mm.

- Immersion Depth : 80 mm.

Calibration Point ( $^{\circ}$ C)	Standard Temperature ( $^{\circ}$ C)	UUC* Reading ( $^{\circ}$ C)	Error ( $^{\circ}$ C)	Uncertainty of measurement ( $\pm$ $^{\circ}$ C)	Coverage factor <i>k</i>
15.0	15.003	15.0	-0.003	0.13	2.00
30.0	30.004	30.0	-0.004	0.13	2.00
45.0	45.002	45.0	-0.002	0.13	2.00

Remark - UUC\* = Unit Under Calibration

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

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