

ภาคผนวก จ  
เอกสารเทียบเครื่องมือที่ใช้ในการตรวจวิเคราะห์



List of Instrument Certificates for Environmental Quality Analysis

No.	Instrument/Equipment	Parameter	Manufacturer	Model/Serial No.	Certification No.	Date of Calibration	Due date of Calibration
1	Analytical Balance	FAT OIL AND GREASE	Mettler Toledo	AB204-SF/ACT / 1123091010	2303074-001-01	27 May 23	25 May 24
2	Analytical Balance	SUSPENDED SOLIDS	Mettler Toledo	XPR205DU / C000071672	23041172	26 Apr 23	25 Apr 24
3	DO Meter	BIOCHEMICAL OXYGEN DEMAND	HI9142	UC4-1320 / 13URC04010201	24T1602	10 Jan 24	8 Feb 25
4	DO Meter	BIOCHEMICAL OXYGEN DEMAND	HI9142	5100 / 118 10183	24T1629	21 Feb 24	18 Feb 25
5	DO Meter	TOTAL COLIFORM BACTERIA	Beckman	HSB001 VITE3000000010205	23T16725	25 Apr 23	25 Apr 24
6	pH Meter	pH	YS Environmental	pH 100A / J202193	23C01804	30 Jul 23	30 Jul 24

Due Date of Calibration: Based on the annual calibration plan At least 1 time per year

List of Instrument Certificates for Environmental Quality Analysis

No.	Instrument/Equipment	Parameter	Manufacturer	Model/Serial No.	Certification No.	Date of Calibration	Due date of Calibration
1	Analytical Balance	FAT OIL AND GREASE	Mettler Toledo	AB204-SF/ACT / 1123091010	2303074-001-01	27 May 23	25 May 24
2	Analytical Balance	SUSPENDED SOLIDS	Mettler Toledo	XPR205DU / C000071672	23041172	26 Apr 23	25 Apr 24
3	DO Meter	BIOCHEMICAL OXYGEN DEMAND	HI9142	UC4-1320 / 1021	23T16118	9 Jun 23	8 Jun 24
4	DO Meter	BIOCHEMICAL OXYGEN DEMAND	HI9142	5100 / 118 10183	23T16178	15 Jun 23	28 Jun 24
5	DO Meter	TOTAL COLIFORM BACTERIA	Beckman	HSB001 VITE3000000010205	23T16172	1 Mar 23	29 Feb 24
6	DO Meter	TOTAL COLIFORM BACTERIA	Beckman	HSB001 VITE3000000010205	23C01804	25 Jun 23	27 Aug 24
7	DO Meter	TOTAL COLIFORM BACTERIA	Beckman	HSB001 VITE3000000010205	23T16172	11 Apr 23	10 Apr 24
8	DO Meter	TOTAL COLIFORM BACTERIA	Beckman	HSB001 VITE3000000010205	23T16172	7 Aug 23	8 Aug 24
9	DO Meter	TOTAL COLIFORM BACTERIA	Beckman	HSB001 VITE3000000010205	23T16172	26 May 23	26 May 24
10	pH Meter	pH	YS Environmental	pH 100A / J202193	23C01804	27 Apr 23	30 Jul 24

Due Date of Calibration: Based on the annual calibration plan At least 1 time per year

List of Instrument Certificates for Environmental Quality Analysis

No.	Instrument/Equipment	Parameter	Manufacturer	Model/Serial No.	Certification No.	Date of Calibration	Due date of Calibration
1	Analytical Balance	FAT OIL AND GREASE	Mettler Toledo	AB204-SF/ACT / 1123091010	2303074-001-01	27 May 23	25 May 24
2	Analytical Balance	SUSPENDED SOLIDS	Mettler Toledo	XPR205DU / C000071672	23041172	2 Apr 23	1 Apr 25
3	DO Meter	BIOCHEMICAL OXYGEN DEMAND	HI9142	5100 / 118 10183	24T1609	21 Feb 24	20 Feb 25
4	DO Meter	BIOCHEMICAL OXYGEN DEMAND	HI9142	5100 / 118 10183	24T1608	1 Apr 24	31 Mar 25
5	DO Meter	TOTAL COLIFORM BACTERIA	Beckman	HSB001 VITE3000000010205	24T16017	1 Apr 24	31 Mar 25
6	pH Meter	pH	YS Environmental	pH 100A / J202193	23C01804	30 Jul 23	30 Jul 24

Due Date of Calibration: Based on the annual calibration plan At least 1 time per year

List of Instrument Certificates for Environmental Quality Analysis

No.	Instrument/Equipment	Parameter	Manufacturer	Model/Serial No.	Certification No.	Date of Calibration	Due date of Calibration
1	Analytical Balance	FAT OIL AND GREASE	Mettler Toledo	AB204-SF/ACT / 1123091010	2303074-001-01	27 May 23	25 May 24
2	Analytical Balance	SUSPENDED SOLIDS	Mettler Toledo	XPR205DU / C000071672	23041172	26 Apr 23	25 Apr 24
3	DO Meter	BIOCHEMICAL OXYGEN DEMAND	HI9142	5100 / 118 10183	23T16118	1 Mar 23	23 Feb 24
4	DO Meter	BIOCHEMICAL OXYGEN DEMAND	HI9142	5100 / 118 10183	23T16178	30 Mar 23	29 Mar 24
5	DO Meter	TOTAL COLIFORM BACTERIA	Beckman	HSB001 VITE3000000010205	23T16172	26 Apr 23	26 Apr 24
6	DO Meter	TOTAL COLIFORM BACTERIA	Beckman	HSB001 VITE3000000010205	23C01804	8 Feb 24	7 Feb 25
7	pH Meter	pH	YS Environmental	pH 100A / J202193	23C01804	27 Apr 23	30 Jul 24

Due Date of Calibration: Based on the annual calibration plan At least 1 time per year

# List of Instrument Certificates for Environmental Quality Analysis

No.	Instrument/Equipment	Parameter	Manufacturer	Model/Serial No.	Calibrator	Certificate No.	Date of Calibration	Date of Calibration
1	Industrial Balance	FAT OIL AND GREASE	Mettler Toledo	AB204.S04A27 / 1120001010	Technology Promotion Association (Thailand-Japan)	2404202	11 May 23	11 May 23
2	Industrial Balance	SUPPLEMENTED SOLIDS	Mettler Toledo	AB204.S04A27 / 1120001010	Technology Promotion Association (Thailand-Japan)	2404202	11 May 23	11 May 23
3	DO Meter	BIOCHEMICAL OXYGEN DEMAND	HANNA	HI9142	Technology Promotion Association (Thailand-Japan)	2414202	21 May 24	21 May 24
4	DO Meter	BIOCHEMICAL OXYGEN DEMAND	HANNA	HI9142	Technology Promotion Association (Thailand-Japan)	2414202	21 May 24	21 May 24
5	DO Meter	TOTAL COLIFORM BACTERIA	HANNA	HI9142	Technology Promotion Association (Thailand-Japan)	2414202	21 May 24	21 May 24
6	DO Meter	pH	HANNA	HI9142	Technology Promotion Association (Thailand-Japan)	2414202	21 May 24	21 May 24

Date of Calibration: Based on the instrument calibration cycle. At least 1 time per year.

United Analyst and Engineering Consultant Co., Ltd. (UAE)  
Certified Laboratory (SCMPC 17025)

Certificate Page 1 of 1

# List of Instrument Certificates for Environmental Quality Analysis

No.	Instrument/Equipment	Parameter	Manufacturer	Model/Serial No.	Calibrator	Certificate No.	Date of Calibration	Date of Calibration
1	Industrial Balance	FAT OIL AND GREASE	Mettler Toledo	AB204.S04A27 / 1120001010	Technology Promotion Association (Thailand-Japan)	2404202	11 May 23	11 May 23
2	Industrial Balance	SUPPLEMENTED SOLIDS	Mettler Toledo	AB204.S04A27 / 1120001010	Technology Promotion Association (Thailand-Japan)	2404202	11 May 23	11 May 23
3	DO Meter	BIOCHEMICAL OXYGEN DEMAND	HANNA	HI9142	Technology Promotion Association (Thailand-Japan)	2414202	21 May 24	21 May 24
4	DO Meter	BIOCHEMICAL OXYGEN DEMAND	HANNA	HI9142	Technology Promotion Association (Thailand-Japan)	2414202	21 May 24	21 May 24
5	DO Meter	TOTAL COLIFORM BACTERIA	HANNA	HI9142	Technology Promotion Association (Thailand-Japan)	2414202	21 May 24	21 May 24
6	DO Meter	pH	HANNA	HI9142	Technology Promotion Association (Thailand-Japan)	2414202	21 May 24	21 May 24

Date of Calibration: Based on the instrument calibration cycle. At least 1 time per year.

United Analyst and Engineering Consultant Co., Ltd. (UAE)  
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Certificate Page 1 of 1



TECHNOLOGY PROMOTION ASSOCIATION (THAILAND-JAPAN)  
CORPORATE SERVICES & EQUIPMENT CALIBRATION AND TESTING SERVICES  
534/4 PATTANAKARN ROAD SOI 18, SUANLUANG, SUANLUANG BANGKOK 10350  
TEL. 0-2717-3000-29 FAX. 0-2719-9454



Cert.No.: 23CH524  
Page: 1 of 3

## Certificate of Calibration

Equipment : pH Meter  
Manufacturer : Horiba  
Model : LAQUA-PH210  
Serial No. : HA0C0025  
ID No. : UAE.EFM.117/2563(EFM.pH.07/03)  
Condition As-Received: Used Item  
Received Date : 26 April 2023  
Calibration Date : 27 April 2023  
Reference : 2304-0707WSC-2  
Submitted by : United Analyst and Engineering Consultant Co.,Ltd.  
3 Sol Udomsak 41, Sukhumvit Road,  
Bangkok, Phrakhanong, Bangkok 10260  
Ambient Temperature : (25 ± 2.5) °C  
Relative Humidity : (50 ± 15) %  
Calibration Procedure : In-house method :  
- CP-CH5 by direct measurement with standard voltage calibrator and direct measurement with certified reference material (CRM)  
- CP-CH8 by comparison with standard thermometer

Calibrated by : Warakorn Lemgagrakul

Approved by :

( / ) Malee Bulkruea  
( ) Sathip Meangmal  
( ) Warakorn Lemgagrakul

Issue Date : 9 May 2023

The Uncertainties are for a confidence probability of approximately 95%

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Cert.No.: 23CH524  
Page: 2 of 3

## Condition of this calibration result

- Reference Standard Instrument : -  
Instrument Serial No. ID No. Cert. No. Due Date  
1) Document Process Calibrator 54030049 130RC116 22E2789 24 Aug 2023  
2) Ref. Standard Thermometer 4982054 110RC044 22I1306 27 Oct 2023  
This certification is traceable to the International System of Unit maintained at:-  
- Traceable to National Institute of Metrology (Thailand), NIMT
- Certified Reference Materials : 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 4.008	CPA chem	863832	28 Dec 2024
pH 6.887	CPA chem	826589	09 July 2023
pH 10.010	CPA chem	863835	28 Dec 2023

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 Fluke at pH (4.7)(7.10)

Unit Under Calibration	Nominal Value	Standard Voltage Input	Actual Reading	Uncertainty of Measurement	Coverage factor
	pH	mV	mV	(±mV)	k
pH Meter	4.00	177.48	177.5	0.058	2.00
SN: HA0C0025	7.00	0.00	0.0	0.058	2.00
	7.00	0.00	0.0	0.058	2.00
	10.00	-177.48	-177.4	0.058	2.00

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Cert.No.: 23CH524  
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#### 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 k
pH Electrode S/N.: Q92M0181	4.008	4.01	177.7	0.0085	2.05
	6.987	7.00	5.7	0.011	2.00
	6.987	7.00	5.5	0.011	2.00
	10.010	10.01	-171.1	0.0095	2.00

##### Function : Temperature Measurement

(\*) Without adjustment

This equipment was connected with Temperature Probe;

- Model : 9652-10D

- Serial No. : Q92M0181

Dimension of probe;

- Length : 103 mm

- Diameter : 15 mm

- Immersion Depth : 80 mm

Calibration Point (°C)	Standard Temperature (°C)	UUC* Reading (°C)	Error (°C)	Uncertainty of measurement ( $\pm$ °C)	Coverage factor k
25.0	25.003	25.0	-0.003	0.13	2.00
30.0	30.003	30.0	-0.003	0.13	2.00
35.0	35.001	35.0	-0.001	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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TECHNOLOGY PROMOTION ASSOCIATION (THAILAND-JAPAN)  
CORPORATE SERVICES 3: EQUIPMENT CALIBRATION AND TESTING SERVICES  
53/4 PATTANAKARN ROAD SOI 18, SUANLIANG, SUANLIANG BANGKOK 10280  
TEL. 0-2717-3000-39 FAX. 0-2719-9484



Cert.No.: 23MM112  
Page: 1 of 3

## Certificate of Calibration

Equipment : Electronic Balance  
Manufacturer : Mettler Toledo  
Model : XSR205  
Serial No. : C008071872  
ID No. : UAE.WAO.012/2563  
Submitted by : United Analyst and Engineering Consultant Co.,Ltd.  
3 Soi Udomsuk 41, Sukhumvit Road,  
Bangkok, Phakhanong,  
Bangkok 10280  
Location : Balance Room  
Received order : 26 April 2023  
Calibration Date : 26 April 2023  
Ambient Temperature : 15 °C to 40 °C  
Relative Humidity : 30 % to 90 %  
Calibrated by : Man Pattananonongsaiboon  
Approved by :   
( ) Ponthippa Tameyakul  
( ) Malee Butkrua  
( ) Suwitt Imjai  
Issue Date : 2 May 2023

The Uncertainties are for a confidence probability of approximately 95 %

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

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Equipment : Electronic Balance  
Condition As-Received : Used Item  
Reference : 2304-0459OC-1

Cert.No.: 23MM112  
Page: 2 of 3

#### Procedure used :-

Calibration were conducted using in-house calibration procedure CP-OB01 according to direct measurement method against standard weight.

#### Condition of this result of calibration

##### 1. Reference standard instruments:-

Instruments	Model	Serial No.	ID No.	Test report No.	Due date
1) Standard Weight Set (E2)	15884	24053	70RC007	MM-0010-22	20 Jan 2024

- This certificate is valid only to the item calibrated on date and place of calibration.
- This result of calibration was made on requested at the point specified by customer.
- This certificate is not certified for any commercial transaction.

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

Result of calibration ( ) Without Adjustment ( ) After Adjustment by Internal Calibration

Range capacity : 0 g to 81 g Resolution 0.00001 g  
61 g to 220 g Resolution 0.0001 g

#### Before Adjustment :

Applied Weight (g)	Balance Reading (g)	Correction (g)	Measurement Uncertainty ( $\pm$ mg)	Coverage Factor (k)
80	80.00005	-0.00005	0.15	2.00
200	199.9999	+0.0001	0.29	2.00

#### After Adjustment :

##### 1. Determination of the standard deviation of weighing machine (n = 10)

Applied Weight (g)	Standard Deviation of Reading (g)
80	0.000007
200	0.000000

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Equipment : Electronic Balance  
Condition As-Received : Used Item  
Reference : 2304-0459OC-1

Cert.No.: 23MM112  
Page: 3 of 3

#### Result of calibration

##### 2. Effect of off center loading

A mass of 100 g was placed to various position on the pan.  
The weighing machine reading error obtained is given in the table

Position 1 (g)	Position 2 (g)	Position 3 (g)	Position 4 (g)	Position 5 (g)	Maximum difference between off-center and central loading (g)
-0.0001	-0.0001	0.0000	-0.0001	-0.0001	0.0001

##### 3. Departure from nominal value

Applied Weight (g)	Balance Reading (g)	Correction (g)	Measurement Uncertainty ( $\pm$ mg)	Coverage Factor (k)
Unload	0.00000	0.00000	0.014	2.13
0.05	0.05001	-0.00001	0.015	2.09
0.1	0.10001	-0.00001	0.015	2.09
1	1.00001	-0.00001	0.018	2.04
5	5.00003	-0.00003	0.026	2.00
20	20.00006	-0.00006	0.045	2.00
50	50.00006	-0.00006	0.080	2.00
80	80.00004	-0.00004	0.15	2.00
100	100.00000	0.00000	0.16	2.00
150	150.00000	0.00000	0.29	2.00
200	200.00000	0.00000	0.29	2.00

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

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TECHNOLOGY PROMOTION ASSOCIATION (THAILAND-JAPAN)  
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TEL. 0-2717-3000-29 FAX. 0-2719-9484



TEC-TS-1781233  
CALIBRATION 000

Cert. No.: 23TM373  
Page: 1 of 3

## Certificate of Calibration

Equipment : Hot Air Oven  
Manufacturer : Memmert  
Model : UF 55  
Serial No. : B212.0411  
ID No. : UAE.WAO.005/2556  
Submitted by : United Analyst and Engineering Consultant Co., Ltd.  
3 Soi Udomsuk 41, Sukhumvit Road,  
Bangchak, Phrakhanong,  
Bangkok 10260  
Location : Lab Floor 2  
Received Order : 11 April 2023  
Calibration Date : 11 - 12 April 2023  
Ambient Temperature :  $(26 \pm 10) ^\circ\text{C}$   
Relative Humidity :  $(50 \pm 30) \%$   
Calibrated by : Krinda Malee  
Approved by :   
( ) Ponthippa Tameyakul  
(x) Malee Butkruea  
( ) Suwit Imjai

Issue Date : 24 April 2023

The Uncertainties are for a confidence probability of approximately 95%

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

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A 0053359



Equipment : Hot Air Oven  
Condition As-Received : Used Item  
Reference : 2304-0156OC-1

Cert. No.: 23TM373  
Page: 2 of 3

### Procedure Used :-

Calibration were conducted using calibration procedure CP-OT02 according to direct measurement method with Data Acquisition which connected with Resistance Temperature Detector (RTD) and Thermocouple Type T.

The temperature scale used was based on ITS-90.

### Condition of this result of calibration

#### 1. Reference standard instrument:-

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

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

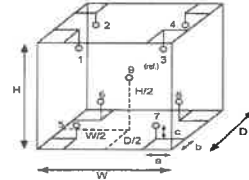
3. This certification is traceable to the International System of Unit.

Result of Calibration :- ( ) Without Adjustment

Function of UUC\* : Temperature Source

Fresh air setting : Close

Environment during calibration		
	Beginning	Finished
Temp. ( °C )	27	28
REL.Humid. ( % )	45	44
AC Supply ( Volt )	221	220



Probe Installation Details : Dimension of Chamber :

a = 5.0 cm	D = 0.50 m
b = 5.0 cm	W = 0.80 m
c = 5.0 cm	H = 0.75 m
	Capacity = 0.30 m <sup>3</sup>

Ref. Std. ID No.: @ Calibration Point		
Position :	( 120 to 180 ) °C	( 104 ) °C
1	18-20TC-01	20RTD-2/1
2	18-20TC-02	20RTD-2/2
3	18-20TC-03	20RTD-2/3
4	18-20TC-04	20RTD-2/4
5	18-20TC-05	20RTD-2/5
6	18-20TC-06	20RTD-2/6
7	18-20TC-07	20RTD-2/7
8	18-20TC-08	20RTD-2/8
9 (ref.)	18-20TC-09	20RTD-2/9

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๑ 1158261



Equipment : Hot Air Oven  
Condition As-Received : Used Item  
Reference : 2304-0156OC-1  
Result of Calibration :- ( ) Without Adjustment  
Function of UUC\* : Temperature Source  
Fresh air setting : Close

Cert. No.: 23TM373  
Page: 3 of 3

Calibration Point ( °C )	UUC* Setting ( °C )	UUC* Reading ( °C )	Temperature stability ( ± °C )	Temperature uniformity ( °C )	Overall Variation ( °C )	Coverage Factor k
104.0	104.0	104.0	0.054	0.59	0.95	2
120.0	120.0	120.0	0.12	0.89	1.5	2
180.0	180.0	180.0	0.12	1.5	2.5	2

Calibration Point ( °C )	Measured Temperature ( °C )									Uncertainty ( ± °C )
	Position									
	1	2	3	4	5	6	7	8	9 (ref.)	
104.0	104.612	104.016	104.542	104.407	103.704	103.729	104.167	104.158	104.001	0.42
120.0	120.317	119.768	120.524	120.232	119.363	119.209	119.888	119.797	119.735	1.1
180.0	180.878	178.819	181.357	180.871	179.303	179.139	180.230	180.055	179.980	1.1

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

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

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

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

UUC\* : Unit Under Calibration

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

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

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๑ 1158260



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TEL. 0-2717-3000-29 FAX. 0-2719-9484



TEC-TS-1781233  
CALIBRATION 000

Cert. No.: 23TM1176  
Page: 1 of 3

## Certificate of Calibration

Equipment : BOD Incubator  
Manufacturer : Arco  
Model : UC4-1320  
Serial No. :  
ID No. : UAE.WAO.002/2550  
Submitted by : United Analyst and Engineering Consultant Co., Ltd.  
3 Soi Udomsuk 41, Sukhumvit Road,  
Bangchak, Phrakhanong,  
Bangkok 10260  
Location : Lab Floor 2  
Received Order : 21 July 2023  
Calibration Date : 21 July 2023  
Ambient Temperature :  $(26 \pm 10) ^\circ\text{C}$   
Relative Humidity :  $(50 \pm 30) \%$   
Calibrated by : Khit Rutianaprapachai  
Approved by :   
( ) Ponthippa Tameyakul  
( ) Malee Butkruea  
(x) Suwit Imjai  
Issue Date : 10 August 2023

The Uncertainties are for a confidence probability of approximately 95%

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

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Equipment : BOD Incubator  
Condition As-Received : Used Item  
Reference : 2307-06150C-1  
Cert. No.: 237M1176  
Page : 2 of 3

Procedure Used :-

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

Condition of this result of calibration

1. Reference standard instrument:-

Instrument Serial No. Cert. No. Traceable Due Date  
1) Data Acquisition MY49001451 23LM27 TPA 25 Feb 2024

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

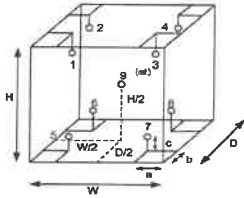
3. This certification is traceable to the International System of Unit.

Remark : TPA : Technology Promotion Association ( Thailand - Japan )

Result of Calibration :- ( ° ) Without Adjustment

Function of UUC\* : Temperature Source

Fresh air setting : Not Available



Probe Installation Details :

Dimension of Chamber :

a = 10 cm D = 0.53 m  
b = 10 cm W = 1.2 m  
c = 10 cm H = 1.2 m  
Capacity = 0.76 m<sup>3</sup>

Environment during calibration		
	Beginning	Finished
Temp. ( °C )	27	28
REL Humid. ( % )	65	67
AC Supply ( Volt )	222	223

Position :	Ref. Std. ID No.:
1	19RTD-2/1
2	19RTD-2/2
3	19RTD-2/3
4	19RTD-2/4
5	19RTD-2/5
6	19RTD-2/6
7	19RTD-2/7
8	19RTD-2/8
9 (ref.)	19RTD-2/9

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Equipment : BOD Incubator  
Condition As-Received : Used Item  
Reference : 2307-06150C-1  
Cert. No.: 237M1176  
Page : 3 of 3

Result of Calibration :- ( ° ) Without Adjustment

Function of UUC\* : Temperature Source

Fresh air setting : Not Available

Calibration Point ( °C )	UUC* Setting ( °C )	UUC* Reading ( °C )	Temperature stability ( ± °C )	Temperature uniformity ( °C )	Overall Variation ( °C )	Coverage Factor k
20.0	20.0	19.7	0.48	0.55	1.2	2

Calibration Point ( °C )	Measured Temperature ( °C )									Uncertainty ( ± °C )
	1	2	3	4	5	6	7	8	9 (ref.)	
20.0	20.048	20.200	20.072	19.768	19.985	20.074	19.851	19.827	19.977	0.74

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

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

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

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

UUC\* : Unit Under Calibration

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

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

-000-

เอกสารไม่ควบคุม

FOSS

Customer Service Report

Date: 24/05/23  
Customer: UAE  
Instrument: KT8100

FOSS South-East Asia  
3388 Srinakharinwirot Building, 25th - 26th Floor, Unit No. 3388/90,  
Rama IV Road, Klongtoey, Bangkok, Thailand 10110

Report No.: 8411  
Address: Bangkok, Thailand  
Serial: 91839052

Hours	Travel To Customer	Labour	Travel From Customer
Start	07:00	08:00	16:30
Finish	08:30	18:00	18:30

Job Type			
Application	Special	Installation	Standard
Normal	Customer Visit	Quote	Training
Distributor	PMA Onboarding	Repair	In House
Internal	Warranty	Remote	PM
Digital Service	Sales Support		Other

PO/Quote Number: 11839052

PMA Type: PMA Type 1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12, 13, 14, 15, 16, 17, 18, 19, 20, 21, 22, 23, 24, 25, 26, 27, 28, 29, 30, 31, 32, 33, 34, 35, 36, 37, 38, 39, 40, 41, 42, 43, 44, 45, 46, 47, 48, 49, 50, 51, 52, 53, 54, 55, 56, 57, 58, 59, 60, 61, 62, 63, 64, 65, 66, 67, 68, 69, 70, 71, 72, 73, 74, 75, 76, 77, 78, 79, 80, 81, 82, 83, 84, 85, 86, 87, 88, 89, 90, 91, 92, 93, 94, 95, 96, 97, 98, 99, 100

Details of Work / Test	Condition / Status
1. Calibration of the instrument	OK
2. Verification of the instrument	OK
3. Calibration of the instrument	OK
4. Verification of the instrument	OK
5. Calibration of the instrument	OK
6. Verification of the instrument	OK
7. Calibration of the instrument	OK
8. Verification of the instrument	OK
9. Calibration of the instrument	OK
10. Verification of the instrument	OK

Part No.	Batch	Description	Qty
10001001	10001001	10001001	1

Signed FOSS: [Signature]  
Signed Customer: [Signature]

Would you be willing to participate in a brief survey in order to tell us how we performed? Yes/No

เอกสารไม่ควบคุม



มูลนิธิศูนย์อาหาร  
ศูนย์บริการข้อมูลและมาตรฐานอาหาร  
Foundation for Industrial Development National Food Institute  
Food Industrial Laboratory Service Center



Calibration Certificate

Certificate No.: 2303074-001-01  
Client name: UNITED ANALYST AND ENGINEERING CONSULTANT CO., LTD.  
Address: 3 Soi Udomsuk 41, Sukhumvit Road, Bangkok, Prakhong, Bangkok 10260

Page 1 of 3

Equipment: Electronic Balance  
Manufacturer: METTLER TOLEDO  
Model: AB204-S/FACT  
Serial No.: 1129361010  
ID No.: UAE.WAS.002/2552  
Order No.: 2303074  
Operation No.: 2303074-001  
Date of Receipt: 26 May 2023  
Date of Calibration: 26 May 2023

Calibrated by: Mr. Phraphat Tuanjit  
Scientist

Approved: [Signature]

Vice President, Department of Laboratory Services  
Responsible for the Technical Management Team

The uncertainties are for a confidence probability of approximately 95%

This certificate is issued in accordance with the conditions of accreditation granted by the Thai Laboratory Accreditation Scheme which has assessed the measurement capability of the laboratory and its traceability to recognized national standards and to the units of measurement realized at the corresponding national standards laboratory. This certificate may not be reproduced other than in full, except with the prior written approval of the National Food Institute.

FCS-009 Revision: 01 Date: 26-04-65

เอกสารไม่ควบคุม



## Calibration Report

Certificate No.: 2303074-001-01  
Equipment: Electronic Balance  
Manufacturer: METTLER TOLEDO  
Model: AB204-S/FACT  
Resolution: 0.0001 g  
Serial No.: 1129361010  
ID No.: UAE.WAS.005/2552  
Capacity: 220 g

Date of Calibration: 26 May 2023 Page 2 of 3

Environment Condition: Ambient Temperature: 23.7 ± 0.1 °C Relative Humidity: 61 ± 2.2 %  
Place of Calibration: Room 108 Balance Room, UNITED ANALYST AND ENGINEERING CONSULTANT CO., LTD.

Condition of Equipment: Good Condition

Condition of This Results of Calibration:

1. Calibration Method: NFI Method WI-M4-001 In-House Method based on UKAS Lab 14 : 2015

2. Reference Standards:

Reference Standard	Model	Serial No.	Calibrated By	Certificate No.	Due Date
Standard Weight Class E2	1mg to 200g	B905547572	TCS	M23040535	8 April 2024
Instrument	Model	Serial No.	Calibrated By	Certificate No.	Due Date
Thermo-Hygro Meter	608-M1	NFI.BTH 018/23	Quality Reborn	QR23-0491	21 February 2024

3. This certification is traceable to SI UNIT

4. This certificate was certified only for the instrument we calibrated.

5. This result of calibration was found accurate as shown on date and place of calibration only.

Calibration Results:

1. Repeatability of Reading:

Nominal Value (g)	Standard Deviation of Reading (g)
100	0.000048
200	0.000048

2. Off-Center Error:

A mass of 100 g was placed and moved to various position on pan.

The balance reading obtained is given in the table.

1	2	3	4	5	6	(Maximum Difference)
99.9995	99.9995	99.9995	99.9999	99.9999	99.9997	0.0003

FCS-012 Revision: 01 Date: 20-04-65

## Calibration Report

Certificate No.: 2303074-001-01  
Equipment: Electronic Balance  
Manufacturer: METTLER TOLEDO  
Model: AB204-S/FACT  
Resolution: 0.0001 g  
Serial No.: 1129361010  
ID No.: UAE.WAS.005/2552  
Capacity: 220 g

Date of Calibration: 26 May 2023 Page 3 of 3

Calibration Results: (Continued)

Calibration Range: 0-200 g

Calibration Adjustment: Internal Calibration

3. Departure from Nominal Value:

Nominal Value	Standard Value	Average Reading	Correction	Uncertainty	Coverage Factor
Unload	0.00000	0.00000	0.00000	0.0000008	2.00
0.01	0.01000	0.01000	0.00000	0.0000088	2.00
0.05	0.05000	0.05000	0.00000	0.0000088	2.00
0.1	0.10000	0.09999	0.00001	0.0000078	2.00
0.2	0.20000	0.19999	0.00001	0.0000068	2.00
0.5	0.50000	0.50000	0.00000	0.0000088	2.00
1	1.00000	1.00000	0.00000	0.0000089	2.00
2	2.00000	2.00000	0.00000	0.0000089	2.00
5	5.00000	5.00000	0.00000	0.0000090	2.00
10	10.00000	9.99999	0.00001	0.0000091	2.00
20	20.00000	20.00000	0.00000	0.0000095	2.00
50	50.00000	49.99999	0.00001	0.000011	2.00
70	70.00000	69.99999	0.00001	0.000013	2.00
100	100.00000	99.99999	0.00001	0.000016	2.00
150	150.00000	149.99999	0.00001	0.000021	2.00
200	200.00000	199.99998	0.00002	0.000028	2.00

The reported uncertainty of measurement was based on a standard uncertainty multiplied by a coverage factor of approximately 95 %.

FCS-012 Revision: 01 Date: 20-04-65

## Verification Certificate

Certificate No.: 2304455-001-01  
Client name: UNITED ANALYST AND ENGINEERING CONSULTANT CO., LTD.  
Address: 3 Soi Udomsuk 41, Sukhumvit Road,  
Bangchack, Prakhonong, Bangkok 10260

Page 3 of 4

Equipment: Digestion Unit (Heating Block)

Manufacturer: VELP SCIENTIFICA

Model: DKL20

Serial No.: 213517

ID No.: UAE.WAS.005/2555

Order No.: 2304455

Operation No.: 2304455-001

Date of Receipt: 28 August 2023

Date of Calibration: 28-29 August 2023

Calibrated by: Mr. Manas Somsak Specialist  
Approved by: (Mr. Ph) Manager, Division Laboratory  
Responsible for the Technical Management Team

Date of Issue: 1 September 2023

The uncertainties are for a confidence probability of approximately 95 %.

This Certificate is issued in accordance with the conditions of accreditation granted by the Thai Laboratory Accreditation scheme which has assessed the measurement capability of the laboratory and its traceability to recognized national standards and to the units of measurement defined at the corresponding national standards laboratory. This certificate may not be reproduced other than in full except with the prior written approval of the National Food Institute.

FCS-009 Revision: 01 Date: 20-04-65

## Verification Report

Certificate No.: 2304455-001-01  
Equipment: Digestion Unit (Heating Block)  
Model: DKL20 Serial No.: 213517  
Resolution: 1 °C ID No.: UAE.WAS.005/2555  
Manufacturer: VELP SCIENTIFICA

Date of Calibration: 28-29 August 2023 Page 2 of 4

Location: Dry Laboratory (312), UNITED ANALYST AND ENGINEERING CONSULTANT CO., LTD.  
Environment Condition: Ambient Temperature ( 28 ± 1 ) °C  
Relative Humidity ( 56 ± 3 ) %  
Line Voltage ( 224 ± 2 ) Volt

Condition of this results of Calibration:

1. This instrument was calibrated by insert standard thermocouples type R into its Digestion blocks and Calibration according to NFI Method W-TE-026 based on BS 4309 : 1968  
- The temperature scale used was based on ITS - 90 .  
- All data show below were final values and the initial data may be obtained upon request.

2. Reference Standard Instrument :

Instrument	Model	Serial No.	Certificate No.	Due Date	Through
Digital Thermometer with Thermocouple Type R	34970A	PM4045576/PM4119453	TC23/0048	2-Jun-2024	N.M. Technical Center Laboratory

3. This certificate is traceable to International System of Units (SI Units).

4. This certificate was certified only for the instrument we calibrated.

5. This result of calibration was found accurate as shown on date and place of calibration only.

6. Condition of Calibrated item : Good

UUC\* Description

Time of Record 1 Hour 6 Minute At 380 °C

7. Result of Calibration : ☒ Without adjustment ☐ After adjustment

FCS-012 Revision: 01 Date: 20-04-65

## Verification Report

Certificate No.: 2304455-001-01  
Equipment: Digestion Unit (Heating Block)  
Model: DKL20 Serial No.: 213517  
Resolution: 1 °C ID No.: UAE.WAS.005/2555  
Manufacturer: VLP SCIENTIFICA

Date of Calibration: 28-29 August 2023

Page 3 of 4

Calibration point: 380 °C

Calibration result:

Table 1: Reporting of Temperature

Block No.	UUC* Setting (°C)	UUC* Reading (°C)	Stability (±°C)	Standard Thermometer (°C)	Uncertainty (±°C)
1	380	380	0.16	378.58	2.0
2	380	380	0.18	378.65	2.0
3	380	380	0.18	381.62	2.0
4	380	380	0.24	380.23	2.0
5	380	380	0.26	379.86	2.0
6	380	380	0.26	380.93	2.0
7	380	380	0.25	381.11	2.0
8	380	380	0.19	382.35	2.0
9	380	380	0.26	381.55	2.0
10	380	380	0.25	380.20	2.0
11	380	380	0.29	382.08	2.0
12	380	380	0.19	382.26	2.0
13	380	380	0.19	382.26	2.0
14	380	380	0.21	382.15	2.0
15	380	380	0.12	382.15	2.0
16	380	380	0.20	381.91	2.0
17	380	380	0.15	381.09	2.0
18	380	380	0.13	381.42	2.0
19	380	380	0.13	381.77	2.0
20	380	380	0.29	382.08	2.0

Note:

- UUC\* = Unit Under Calibration
- Immersion depth of standard thermometer in tube level high of sand is equal heater plate of UUC.
- Stability = One-half of the greatest maximum difference of measured temperatures at one sensors, for at least half an hour after reaching steady state.

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

F-CS-012 Revision: 01 Date: 20-04-65

## Verification Report

Certificate No.: 2304455-001-01  
Equipment: Digestion Unit (Heating Block)  
Model: DKL20 Serial No.: 213517  
Resolution: 1 °C ID No.: UAE.WAS.005/2555  
Manufacturer: VLP SCIENTIFICA

Date of Calibration: 28-29 August 2023

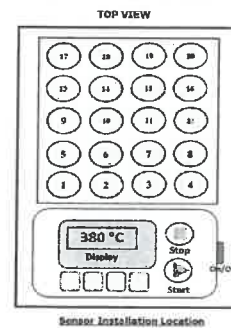
Page 4 of 4

Calibration point: 380 °C

Calibration result:

Continued

Figure 1. Location of Reference Standard and Block Diagram of Digestion Unit



Sensor Installation Location

----- End -----

F-CS-012 Revision: 01 Date: 20-04-65

## Certificate of Calibration

Equipment: Autoclave  
Model: CL-40L  
Serial No. (or ID.): 810010  
Manufacturer: ALP  
Condition: In Condition

Certificate No.: C11230108  
Issued Date: 11 June 2023  
Job No.: KSPR2308770  
Page: 1 of 4

Customer: United Analyst and Engineering Consultant Company Limited.  
3 Soi Udomsuk 41 Sukhumvit Road,  
Bangkok, Prakanong, Bangkok 10260 Thailand.

Environment Condition: Temperature: 22 °C ± 0.8 °C  
Humidity: 58 %RH ± 4.0 %RH  
Voltage: 228 VAC ± 1.3 VAC

Calibration Place: United Analyst and Engineering Consultant Company Limited. (301 Room)  
3 Soi Udomsuk 41 Sukhumvit Road,  
Bangkok, Prakanong, Bangkok 10260 Thailand.

Calibration By: Mr. Anomthep Phumpha  
Calibration Date: 09 June 2023

The Method used: In house method, CAL-WI-18, base on BS 2646 : Part 5

Traceability: This certificate is traceable to the SI Units maintained by National Institute of Metrology (NIMT), Thailand through Quality reborn Co., Ltd.  
Certificate No. QR23-0086

(Mr. Anomthep Phumpha)

Person in charge

(Mr. Udon Srichana)

Authorized signatory

This certificate is issued to the units of measurement according to the International System of Units (SI). It provides traceability of measurement to international or national standard or other recognized national standard laboratories.

The measurement uncertainty stated is the expanded uncertainty which is obtained from the standard uncertainty multiplied by the coverage factor (k=2) to provide a level of confidence of approximately 95%. It is determined in accordance with the Guide to Expression of Uncertainty in Measurement (GUM).

These results may be affected by deviations from specified conditions. The results relate only to the items tested, calibrated or sampled. The report shall not be reproduced except in full without approval of DKSH Technology Limited.

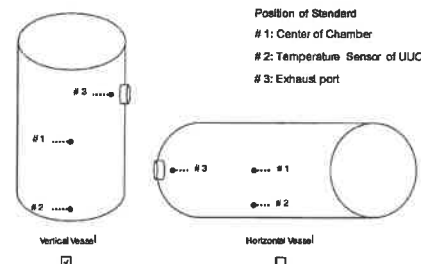
บริษัท เทคโนโลยี ดีเคเอส เอช จำกัด  
DKSH Technology Limited  
2523 สุขุมวิท ถนนสุขุมวิท กรุงเทพมหานคร 10260  
2523 Sukhumvit Road, Bangkok, Prakanong, Bangkok 10260  
Phone: +66 2639 7000 Email: info.calibration@dksh.com Website: www.dksh.com/thailand-thailand

Delivering Growth - In Asia and Beyond.

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CAL-FM-C11-15: 12 Sep 2022

Certificate No.: C11230108

Page: 2 of 4



Vertical Vessel

Horizontal Vessel

### Standard Installation Locations

Standard Locations (#1): Geometric center of the chamber  
Standard Locations (#2): Distance from temperature sensor of UUC 2 (cm.)  
Standard Locations (#3): Distance from the wall 5 (cm.)

Position of Std	#1	#2	#3
Channel of Logger	4	5	6

### Definitions

**Indicating Temperature:** The average reading of indicating device which forms the integral part of the enclosure.

**Measured Temperature:** The average reading of standards at any positions or location.

**Measured Stability:** The one-half of greatest maximum difference of measured temperatures at any one probe.

บริษัท เทคโนโลยี ดีเคเอส เอช จำกัด  
DKSH Technology Limited  
2523 สุขุมวิท ถนนสุขุมวิท กรุงเทพมหานคร 10260  
2523 Sukhumvit Road, Bangkok, Prakanong, Bangkok 10260  
Phone: +66 2639 7000 Email: info.calibration@dksh.com Website: www.dksh.com/thailand-thailand

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CAL-FM-C11-15: 12 Sep 2022



### Calibration Results:

#### Without adjustment

Measurement Temperature at Spread Locations, Indicating of Unit Under Calibration: 115.0 °C

Locations	Measured Temperature (°C)	Correction of UUC (°C)	Uncertainty (± °C)
#1	115.34	0.34	0.35
#2	115.43	0.43	0.35
#3	115.43	0.43	0.35

#### Temperature Distribution

Temperature			Pressure	Measured Temperature at Spread Locations			Uncertainty
Desired (°C)	Setting (°C)	Indicating (°C)	Indicating Mpa	#1 (°C)	#2 (°C)	#3 (°C)	(± °C)*
115	115	115.0	0.08	115.34	115.43	115.43	0.35

#### Chamber Characterization

Indicating Temperature (°C)	Indicating Pressure Mpa	Measured Stability (± °C)
115.0	0.08	0.15

Note: \* Maximum uncertainty of the each position

Record every 10 seconds after reaching steady state or after one achieved complete cycle.

#### Without adjustment

Measurement Temperature at Spread Locations, Indicating of Unit Under Calibration: 121.0 °C

Locations	Measured Temperature (°C)	Correction of UUC (°C)	Uncertainty (± °C)
#1	121.34	0.34	0.35
#2	121.40	0.40	0.35
#3	121.26	0.26	0.35

#### Temperature Distribution

Temperature			Pressure	Measured Temperature at Spread Locations			Uncertainty
Desired (°C)	Setting (°C)	Indicating (°C)	Indicating Mpa	#1 (°C)	#2 (°C)	#3 (°C)	(± °C)*
121	121	121.0	0.12	121.34	121.40	121.26	0.35

#### Chamber Characterization

Indicating Temperature (°C)	Indicating Pressure Mpa	Measured Stability (± °C)
121.0	0.12	0.07

Note: \* Maximum uncertainty of the each position

Record every 10 seconds after reaching steady state or after one achieved complete cycle.

The End of Certificate



## Certificate of Calibration

**Equipment:** Cooled Incubator  
**Model:** KB 400  
**Serial No.(or ID):** 20220000022479  
**Manufacturer:** Binder  
**Condition:** New  
**Shelves(pc.):** 5

**Customer:** United Analyst and Engineering Consultant Company Limited.  
3 Soi Udomsuk 41 Sukhumvit Road,  
Bangkok, Prakanong, Bangkok 10260 Thailand.

**Environment Condition:**  
**Temperature:** 25 °C ± 1.0 °C  
**Humidity:** 49 %RH ± 5.3 %RH  
**Voltage:** 232 VAC ± 1.2 VAC

**Calibration Place:** United Analyst and Engineering Consultant Company Limited. ( Control Area )  
3 Soi Udumsuk 41 Sukhumvit Road,  
Bangkok, Prakanong, Bangkok 10260 Thailand.

**Calibration By:** Mr. Thanakrit Raksepol  
**Calibration Date:** 07 August 2023  
**The Method used:** In house method, CAL-WI-16, base on TLAS-G20  
**Traceability:** This certificate is traceable to the SI Units maintained by National Institute of Metrology (NIMT), Thailand through DKSH Technology Limited.  
Certificate No. C10230019

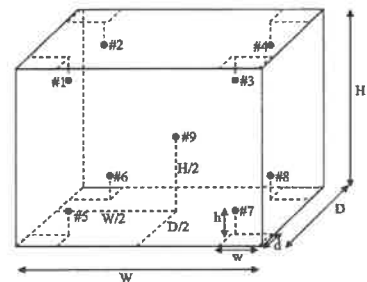
(Mr. Thanakrit Raksepol)

Person in charge

(Mr. Udon Sirichana)

Authorized signatory

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



#### Standard Installation Locations

Volume (Calibration Zone)= 163 (Liters)

Inside chamber: W = 65 (cm) D = 49 (cm) H = 127 (cm)

Standard Locations (#1, #2, #3, #4): w = 7 (cm) d = 6 (cm) h = 15 (cm)

Standard Locations (#5, #6, #7, #8): w = 7 (cm) d = 5 (cm) h = 15 (cm)

#9: Geometric center of the chamber

Position of Std	#1	#2	#3	#4	#5	#6	#7	#8	#9
Channel of Logger	301	302	303	304	305	306	307	308	309

#### Definitions

**Indicating Temperature:** The average reading of indicating device which forms the integral part of the enclosure.

**Measured Temperature:** The average reading of standards at any positions or location.

**Measured Uniformity:** The maximum difference of measured temperatures between of any probes and the measured temperature at the reference location which are observed at same time or at close observation time as possible to determine the temperature pattern or homogeneity with the chamber at steady-state. The reference probe is preferably located in the geometric center of the chamber.

**Measured Stability:** The one-half of greatest maximum difference of measured temperatures at any one probe.

**Overall Variation:** The difference of maximum and minimum measured temperatures throughout observation time.

Calibration Results:  
Without adjustment

Measurement Temperature at Spread Locations, Indicating of Unit Under Calibration: 35.0 °C

Locations	Measured Temperature (°C)	Correction of UUC (°C)	Uncertainty (± °C)
#1	35.11	0.11	0.23
#2	35.04	0.04	0.23
#3	35.03	0.03	0.23
#4	35.13	0.13	0.23
#5	35.02	0.02	0.23
#6	35.07	0.07	0.23
#7	34.97	-0.03	0.23
#8	34.97	-0.03	0.23
#9	35.10	0.10	0.23

Temperature Distribution

Desired (°C)	Setting (°C)	Indicating (°C)	Measured Temperature at Spread Locations (°C)									Uncertainty (± °C)*
			#1	#2	#3	#4	#5	#6	#7	#8	#9	
35.0	35.0	35.0	35.11	35.04	35.03	35.13	35.02	35.07	34.97	34.97	35.10	0.23

Chamber Characterization

Indicating (°C)	Measured Uniformity (°C)	Measured Stability (± °C)	Overall Variation (°C)
35.0	0.16	0.04	0.22

Note: \* Maximum uncertainty of the each position

The End of Certificate

Statements of conformity:

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

The correction of indication determined during calibration are under given measurement and environmental conditions and considering the expanded measurement uncertainty (coverage probability 95%) within the specification. The given measurement uncertainty already includes other all effects by according to the standard method, TLAS-G20. Therefore, those parameters have not been assessed separately.

Tolerance and Decision rules:

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

Decision rule: ☐ Choice A Binary Statement for Simple Acceptance Rule ( $w = 0$ ), Specific Risk < 50% PFA.

☒ Choice B Non-binary statement with guard band ( $w = 1$  U), Pass or Fail Specific Risk < 2.5% PFA and Condition Pass or Condition Fail Specific Risk < 50% PFA.

☐ Choice C Customer defined, Customers may define arbitrary multiple of  $r$  to have applied as guard band ( $w = r$  U).  
; PFA - Probability of False Accept



Authorized signatory

Without adjustment

Desired Temperature : 35.0°C Tolerance: 0.5 °C

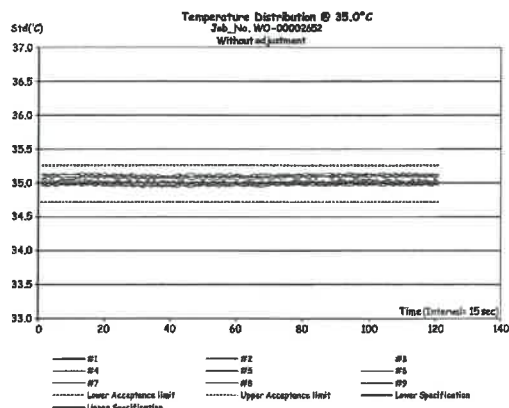
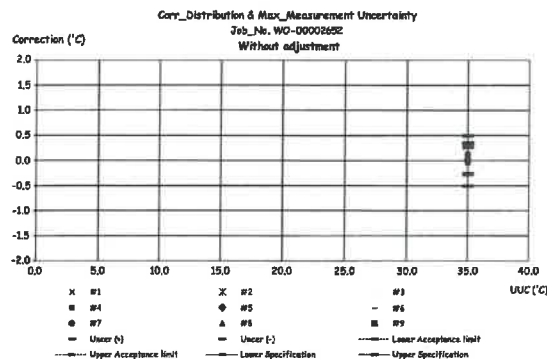
Measurement Temperature at Spread Locations, Indicating of Unit Under Calibration: 35.0 °C

Locations	Measured (°C)	Correction* (°C)	Guard band (W) (± °C)	Tolerance (± °C)	Conformity
#1	35.11	0.11	0.23	0.5	Pass
#2	35.04	0.04	0.23	0.5	Pass
#3	35.03	0.03	0.23	0.5	Pass
#4	35.13	0.13	0.23	0.5	Pass
#5	35.02	0.02	0.23	0.5	Pass
#6	35.07	0.07	0.23	0.5	Pass
#7	34.97	-0.03	0.23	0.5	Pass
#8	34.97	-0.03	0.23	0.5	Pass
#9	35.10	0.10	0.23	0.5	Pass

Correction\* = Measured Temperature - Desired Temperature

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

The End of Statements of Conformity



ใบตรวจสอบสภาพเครื่องควบคุมอุณหภูมิ

เลขที่ใบงาน: WO-00002652

ชนิดเครื่อง: Cooled Incubator

รุ่น: KB 400

หมายเลขเครื่อง: 20220000022478.000

ตรวจสอบ (รับ)		ตรวจสอบ (ส่ง)		หมายเหตุ
07 Aug 2023	รายการตรวจสอบ	07 Aug 2023		
ปกติ	ไม่ปกติ	ปกติ	ไม่ปกติ	
<b>General</b>				
<input checked="" type="checkbox"/>	<input type="checkbox"/>	1. สายไฟ	<input checked="" type="checkbox"/>	
<input checked="" type="checkbox"/>	<input type="checkbox"/>	2. การทำงาน Main Switch	<input checked="" type="checkbox"/>	
<input checked="" type="checkbox"/>	<input type="checkbox"/>	3. การทำงาน Selector Key	<input checked="" type="checkbox"/>	
<input checked="" type="checkbox"/>	<input type="checkbox"/>	4. การแสดงผล Display	<input checked="" type="checkbox"/>	
<input checked="" type="checkbox"/>	<input type="checkbox"/>	5. การทำงาน ฟัดลม	<input checked="" type="checkbox"/>	
<input type="checkbox"/>	<input type="checkbox"/>	6. สภาพ Lever of Ventilation valve	<input type="checkbox"/>	ไม่มี
<input checked="" type="checkbox"/>	<input type="checkbox"/>	7. สภาพ Lever door open / close	<input checked="" type="checkbox"/>	
<input checked="" type="checkbox"/>	<input type="checkbox"/>	8. สภาพ Door seal	<input checked="" type="checkbox"/>	
<input checked="" type="checkbox"/>	<input type="checkbox"/>	9. การทำงานของระบบ Safety	<input checked="" type="checkbox"/>	
<input checked="" type="checkbox"/>	<input type="checkbox"/>	10. การทำงานของระบบทำความเย็น	<input checked="" type="checkbox"/>	
<input type="checkbox"/>	<input type="checkbox"/>	11. การทำงานของระบบทำความร้อน	<input type="checkbox"/>	ไม่มี
<input checked="" type="checkbox"/>	<input type="checkbox"/>	12. สภาพตู้เครื่อง	<input checked="" type="checkbox"/>	
<input checked="" type="checkbox"/>	<input type="checkbox"/>	13. สภาพแวดล้อม ณ สถานที่ตั้งเครื่อง	<input checked="" type="checkbox"/>	

ข้อแนะนำ:

Mr. Thanakrit Rakasop  
Service Engineer



CERT.No.: HS-U012C

Harikul Science Co.,Ltd.  
694 Soi Ratchaditwong 24, Pracharabamphen,  
Samsenok, Huai Khwang, Bangkok 10310  
Tel: 0-2274-2456 Fax: 0-2274-2443  
Email: info@harikul.com www.harikul.com  
Certificate of Calibration

Calibration Date : 1 Mar 23

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

3 Soi Udomsuk 41, Sukhumvit Road, Bangchak,  
Phrakhanong, Bangkok (Head office)

Avg Room Temp : 20 °C

Avg Water Temp : 20 °C

Air Pressure : 760.00 mmHg

Salinity : 0 ppt

Model : YSI S100

S/N : 11B101853

Probe : YSI S010

S/N : 22B100125

ID NO. : -

Air Temp ref : S/N. E00522

Barometric ref : S/N. E00522

Water Temp ref : S/N. 11431

Technician : Kilipong M.

## Calibration Details

Calibration Point	100% air sat. (@20 °C, DO = 9.09 mg/l)	(status)	(status)
Measurement 1 (mg/l)	9.09	(PASS)	-
Measurement 2 (mg/l)	9.09	(PASS)	-
Measurement 3 (mg/l)	9.09	(PASS)	-
Measurement 4 (mg/l)	9.09	(PASS)	-
Measurement 5 (mg/l)	9.09	(PASS)	-
Measurement 6 (mg/l)	9.09	(PASS)	-
Measurement 7 (mg/l)	9.09	(PASS)	-
Measurement 8 (mg/l)	9.09	(PASS)	-
Measurement 9 (mg/l)	9.09	(PASS)	-
Measurement 10 (mg/l)	9.09	(PASS)	-

Mean Measurement	9.09	mg/l	-
Inaccuracy	0.00	mg/l	-

Overall Status (PASS)

## Manufacturer Specification

Accuracy = +/- 0.02 mg/l

- This certificate is issued based on the result that are found as shown on date and place of last only.
- The calibration procedure followed in accordance with Harikul Science Co., Ltd.
- This result shall not be used for advertising purpose.

Technician Signature

(Kilipong Maekwong)

เอกสารไมตรีบุญ  
(Suprecha Sumritam)



TECHNOLOGY PROMOTION ASSOCIATION (THAILAND-JAPAN)  
CORPORATE SERVICES 3: EQUIPMENT CALIBRATION AND TESTING SERVICES  
1344 FATTAKARN ROAD SOI 18, SUANLUANG, SUANLUANG BANGKOK 10259  
TEL. 0-2717-3000-39 FAX. 0-2719-4444



Cert.No.: 23CH524  
Page: 1 of 3

## Certificate of Calibration

Equipment : pH Meter  
Manufacturer : Horiba  
Model : LAQUA-PH210  
Serial No. : HA0C0025  
ID No. : UAE.EFM.117/2563(EFM.pH.07/63)  
Condition As-Received: Used Item  
Received Date : 26 April 2023  
Calibration Date : 27 April 2023  
Reference : 2304-0707VSC-2  
Submitted by : United Analyst and Engineering Consultant Co., Ltd.  
3 Soi Udomsuk 41, Sukhumvit Road,  
Bangchak, Phrakhanong, Bangkok 10260  
Ambient Temperature : (25 ± 2.5) °C  
Relative Humidity : (50 ± 15) %  
In-house method :  
Calibration Procedure :  
- CP-CH5 by direct measurement with standard voltage calibrator and direct measurement with certified reference material (CRM)  
- CP-CHB by comparison with standard thermometer

Calibrated by : Warakorn Lemgagrakul

Approved by :

( / ) Malee Bulkrusa  
( / ) Sathip Meangmal  
( / ) Warakorn Lemgagrakul

Issue Date : 9 May 2023

The Uncertainties are for a confidence probability of approximately 95%

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

เอกสารไมตรีบุญ



Cert.No.: 23CH524  
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	22E2769	24 Aug 2023
2) Ref. Standard Thermometer	4982054	110RC044	22H306	27 Oct 2023

This certification is traceable to the International System of Unit maintained at:-  
- Traceable to National Institute of Metrology (Thailand), NIMT

2. Certified Reference Materials : The measurement results are traceable to SI through CPA chem Ltd.,  
ANSI-ASQ National Accreditation Board, Accredited No. AR-1635

Buffer Solution	Manufacturer	Lot No.	Exp. date
pH 4.008	CPA chem	863832	28 Dec 2024
pH 6.987	CPA chem	826589	09 July 2023
pH 10.010	CPA chem	863835	28 Dec 2023

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 Fluke at pH (4,7)(7,10)

Unit Under Calibration	Nominal Value	Standard Voltage Input	Actual Reading		Uncertainty of Measurement ( ± mV )	Coverage factor k
			mV	pH		
pH Meter S/N.: HA0C0025	4.00	177.48	177.5	4.01	0.056	2.00
	7.00	0.00	0.0	7.02	0.056	2.00
	7.00	0.00	0.0	7.02	0.056	2.00
	10.00	-177.48	-177.4	10.01	0.056	2.00



Cert.No.: 23CH524  
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 ( ± )	Coverage factor k
pH Electrode S/N.: Q92M0181	4.008	4.01	177.7	0.0085	2.05
	6.987	7.00	5.7	0.011	2.00
	6.987	7.00	5.5	0.011	2.00
	10.010	10.01	-171.1	0.0085	2.00

## Function : Temperature Measurement

(\*) Without adjustment

This equipment was connected with Temperature Probe;

- Model : 9652-10D  
- Serial No. : Q92M0181  
Dimension of probe:  
- Length : 103 mm  
- Diameter : 16 mm  
- Immersion Depth : 90 mm

Calibration Point ( °C )	Standard Temperature ( °C )	UUC* Reading ( °C )	Error ( °C )	Uncertainty of measurement ( ± °C )	Coverage factor k
25.0	25.003	25.0	-0.003	0.13	2.00
30.0	30.003	30.0	-0.003	0.13	2.00
35.0	35.001	35.0	-0.001	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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Cert.No.: 23MM112  
Page.: 1 of 3

## Certificate of Calibration

Equipment : Electronic Balance  
Manufacturer : Mettler Toledo  
Model : XSR205  
Serial No. : C009071872  
ID No. : UAE.WAO.012/2563  
Submitted by : United Analyst and Engineering Consultant Co.,Ltd.  
3 Soi Udomsuk 41, Sukhumvit Road,  
Bangchak, Phrakhanong,  
Bangkok 10260  
Location : Balance Room  
Received order : 26 April 2023  
Calibration Date : 26 April 2023  
Ambient Temperature : 15 °C to 40 °C  
Relative Humidity : 30 % to 90 %  
Calibrated by : Man Pattanapongpaiboon  
Approved by :   
( ) Ponthippa Tameyakul  
( ) Malee Butkruea  
(x) Suwit Imjai  
Issue Date : 2 May 2023

The Uncertainties are for a confidence probability of approximately 95%

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

เอกสารไม่ควบคุม



Equipment : Electronic Balance  
Condition As-Received : Used Item  
Reference : 2304-0459QC-1  
Procedure used :-

Cert.No.: 23MM112  
Page: 2 of 3

Calibration were conducted using in-house calibration procedure CP-QB01 according to direct measurement method against standard weight.

Condition of this result of calibration

1. Reference standard instruments:-

Instruments	Model	Serial No.	ID No.	Test report No.	Due date
1) Standard Weight Set (E2)	15884	24053	70RC007	MM-0010-22	20 Jan 2024
2. This certificate is valid only to the item calibrated on date and place of calibration.					
3. This result of calibration was made on requested at the point specified by customer.					
4. This certificate is not certified for any commercial transaction.					
5. This certification is traceable to the International System of Unit.					
Result of calibration ( ) Without Adjustment ( * ) After Adjustment by Internal Calibration					
Range capacity : 0 g to 81 g Resolution 0.00001 g					
81 g to 220 g Resolution 0.0001 g					

Before Adjustment :

Applied Weight	Balance Reading	Correction	Measurement Uncertainty	Coverage Factor
(g)	(g)	(g)	(± mg)	(k)
80	80.00005	-0.00005	0.15	2.00
200	199.9999	+0.0001	0.29	2.00

After Adjustment :

1. Determination of the standard deviation of weighing machine (n = 10)

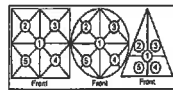
Applied Weight	Standard Deviation of Reading (g)
(g)	
80	0.000007
200	0.00000

เอกสารไม่ควบคุม



Equipment : Electronic Balance  
Condition As-Received : Used Item  
Reference : 2304-0459QC-1  
Result of calibration

Cert.No.: 23MM112  
Page: 3 of 3



Maximum difference between off-center and central loading

Position 1	Position 2	Position 3	Position 4	Position 5	
(g)	(g)	(g)	(g)	(g)	(g)
-0.0001	-0.0001	0.0000	-0.0001	-0.0001	0.0001

3. Departure from nominal value

Applied Weight	Balance Reading	Correction	Measurement Uncertainty	Coverage Factor
(g)	(g)	(g)	(± mg)	(k)
Unload	0.00000	0.00000	0.014	2.13
0.05	0.05001	-0.00001	0.015	2.09
0.1	0.10001	-0.00001	0.015	2.09
1	1.00001	-0.00001	0.018	2.04
5	5.00003	-0.00003	0.026	2.00
20	20.00006	-0.00006	0.045	2.00
50	50.00006	-0.00006	0.080	2.00
80	80.00004	-0.00004	0.15	2.00
100	100.00000	0.00000	0.16	2.00
150	150.00000	0.00000	0.29	2.00
200	200.00000	0.00000	0.29	2.00

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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เอกสารไม่ควบคุม



Cert.No.: 23TM726  
Page: 1 of 3

## Certificate of Calibration

Equipment : Cooled Incubator  
Manufacturer : Binder  
Model : KB 400 E6  
Serial No. : 2020000015535  
ID No. : UAE.MIC.018/2564  
Submitted by : United Analyst and Engineering Consultant Co.,Ltd.  
3 Soi Udomsuk 41, Sukhumvit Road,  
Bangchak, Phrakhanong,  
Bangkok 10260  
Location : Microbiology Laboratory (302)  
Received Order : 27 April 2023  
Calibration Date : 27 April 2023  
Ambient Temperature : (26 ± 1) °C  
Relative Humidity : (50 ± 30) %  
Calibrated by : Tewatchai Pama

Approved by :

( ) Ponthippa Tameyakul  
(x) Malee Butkruea  
( ) Suwit Imjai

Issue Date : 12 May 2023

The Uncertainties are for a confidence probability of approximately 95%

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

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Equipment : Cooled Incubator  
Condition As-Received : Used Item  
Reference : 2304-0461OC-1  
Cert. No.: 23TM726  
Page: 2 of 3

Procedure Used :-

Calibration were conducted using calibration procedure CP-OT02 according to direct measurement method with Data Acquisition which connected with Resistance Temperature Detector ( RTD ).

The temperature scale used was based on ITS-90.

Condition of this result of calibration

1. Reference standard instrument-

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

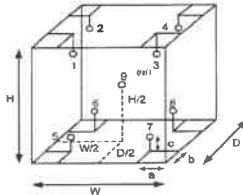
2. This certificate is valid only to the item calibrated on date and place of calibration.

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

Result of Calibration :- ( ° ) Without Adjustment

Function of UUC\* : Temperature Source

Fresh air setting : Close



Probe Installation Details :

Dimension of Chamber :

a = 10 cm D = 0.48 m  
b = 10 cm W = 0.65 m  
c = 10 cm H = 1.2 m  
Capacity = 0.37 m<sup>3</sup>

Environment during calibration		
	Beginning	Finished
Temp. ( °C )	20	19
REL.Humid. ( % )	72	82
AC Supply ( Volt )	230	231

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

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Equipment : Cooled Incubator  
Condition As-Received : Used Item  
Reference : 2304-0461OC-1  
Cert. No.: 23TM726  
Page: 3 of 3

Result of Calibration :-

( ° ) Without Adjustment

Function of UUC\* : Temperature Source

Fresh air setting : Close

Calibration Point ( °C )	UUC* Setting ( °C )	UUC* Reading ( °C )	Temperature stability ( ± °C )	Temperature uniformity ( °C )	Overall Variation ( °C )	Coverage Factor k
35.0	35.0	35.0	0.0090	0.16	0.21	2

Calibration Point ( °C )	Measured Temperature ( °C )									Uncertainty ( ± °C )
	1	2	3	4	5	6	7	8	9 (ref.)	
35.0	34.913	34.997	34.834	34.893	35.034	35.027	35.025	35.035	34.980	0.30

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

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

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

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

UUC\* : Unit Under Calibration

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

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

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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 FAX. 0-2719-9484

Cert.No.: 24TW39  
Page: 1 of 2

## Certificate of Testing

Equipment : DO Meter  
Manufacturer : YSI  
Model : 5100  
Serial No. : 11B 101863  
ID No. : UAE.WAO.004/2554  
Received Date : 20 February 2024  
Test Date : 21 February 2024  
Reference : 2402-0628DSC-1  
Submitted by : United Analyst and Engineering Consultant Co., Ltd.  
3 Sol Udomsuk 41, Sukhumvit Road, Bangkok,  
Phrakhanong, Bangkok 10260  
Laboratory Condition : Temperature ( 25 ± 5 ) °C  
Humidity ( 50 ± 20 ) %  
Test Procedure : In - house method : CP-CH9  
by Comparison Technique with Azide Modification Method

Tested by : Waleak Sirithan

Approved by :

Approved Signature

( ) Pornthipsa Taneyakul  
( ) Unnopphol Herachai  
(✓) Sathip Meangmai

Issue Date : 22 February 2024

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Cert.No.: 24TW39  
Page: 2 of 2

Condition of this result of calibration

1. Reference Standard Instruments :

This certification is traceable to the International System of Unit through the reference standards laboratory of Industrial Calibration Center, Technology Promotion Association (Thailand-Japan).

Instruments	Serial No.	ID No.	Certificate No.	Due Date
1. Burette	-	130BU10	23CG1172	22 Mar 2025
2. Balance	14233821	110RC001	23MM405	16 July 2024

2. Standard Material :-

Material	Manufacturer	Lot.No.	Assay
Sodium Thiosulfate pentahydrate	Merck	AM1763316	100.2%

Result : Dissolved Oxygen Meter Adjustment With Air 100 %  
Dissolved Oxygen Probe No.: 22B100125

Titration Method (Azide Modification Method) (mg/L)	DO Meter Reading (mg/L)	Standard Deviation (mg/L)
8.20	8.18	0.0055

This report was certified only for the instrument we tested. It is allowable to use for study intend to use for advertising and referral purpose is prohibited. This report may not be reproduced other in full without written approval of the laboratory

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## Customer Service Report

Report No: 9810

Date: 9 Feb 2024  
Customer: URB  
Instrument: KT200Address: Bangkok  
Serial: 91790524

Travel To Customer		Labour		Travel From Customer	
Start	08:30	09:30	10:30	14:30	15:30
Finish	09:30	11:00	12:00	15:30	16:30

Application		Special		Job Type		Standard	
Normal	x	Courtesy Visit	x	Installation	x	Training	x
Distributor	x	PMA Onboarding	x	Quote	x	In House	x
Internal	x	Warranty	x	Repair	x	PM	x
Digital Service	x	Sales Support	x	Remote	x	Other	x

PO/Quote Number: - If applicable

PMA Type: ☒ ☐ If applicable Contract No. If applicable

Details of Work / Test	Condition / Status
A. Pre-Test - ตรวจสอบสภาพเครื่อง (PM) - ตรวจสอบอุณหภูมิ 3 วัน 100 °C - Pre-Test 50 °C - 50 °C - ตรวจสอบสภาพเครื่อง - ตรวจสอบสภาพเครื่อง	
B. Post-Test - ตรวจสอบสภาพเครื่อง - ตรวจสอบสภาพเครื่อง - ตรวจสอบสภาพเครื่อง - ตรวจสอบสภาพเครื่อง	

Instrument Ready for Use ☒ ☐ Not OK - Comment

Part No.	Batch	Description	Qty
10004915	14.12.2020	FOSS KT200 10004915 10004915	1

I confirm this report is accurate and complete			
Signed FOSS		Signed Customer	เอกสิทธิ์ งามวิจิตร
Name		Name	

Would you be willing to participate in a brief survey in order to tell us how we performed? Email

เอกสารไม่ควบคุม

## Verification Certificate

Certificate No.: 2302413-001-01  
Client name: UNITED ANALYST AND ENGINEERING CONSULTANT CO., LTD.  
Address: 3 Soi Udomsuk 43, Sukhumvit Road,  
Bangchack, Prakhong, Bangkok 10260

Page 1 of 4

Equipment: HEATING BLOCK DIGESTION

Manufacturer: FOSS

Model: 2520

Serial No.: 91794469

ID No.: UAE.WAS.011/2560

Order No.: 2302413

Operation No.: 2302413-001

Date of Receipt: 28 March 2023

Date of Calibration: 30-31 March 2023

Calibrated by Mr. Nutapol Niyomchat  
SpecialistApproved by (M)  
Manager, Division of Calibration Laboratory  
Responsible for the Technical Management Team

Date of Issue: 10 April 2023

The uncertainties are for a confidence probability of approximately 95 %.

This Certificate is issued in accordance with the conditions of accreditation granted by the Thai Laboratory Accreditation scheme which has assessed the measurement capability of the laboratory and its traceability to recognized national standards and to the units of measurement related at the corresponding national standards laboratory. This certificate may not be reproduced other than in full except with the prior written approval of the National Food Institute.

FCS-009 Revision: 01 Date: 20-04-25

## Verification Report

Certificate No.: 2302413-001-01  
Equipment: HEATING BLOCK DIGESTION  
Model: 2520 Serial No.: 91794469  
Resolution: 1 °C ID No.: UAE.WAS.011/2560  
Manufacturer: FOSS

Date of Calibration: 30-31 March 2023 Page 2 of 4

Location: Laboratory Room, NATIONAL FOOD INSTITUTE  
Environment Condition: Ambient Temperature ( 25 ± 3 ) °C  
Relative Humidity ( 55 ± 15 ) %  
Line Voltage ( 220 ± 10 ) Volt

## Condition of this result of Calibration:

- This instrument was calibrated by insert standard thermocouples type R into its heating block digestion and compared to temperature obtained from reference standards thermometer at calibrated point.
  - The temperature scale used was based on ITS - 90.
  - All data show below were final values and the initial data may be obtained upon request.

## 2. Reference Standard Instrument:

Instrument	Model	Serial No.	Certificate No.	Due Date	Through
Digital Thermometer with Thermocouple	34970A	8764045529/8761194453	TC22/0044	5-May-2023	N.M. Technical Center Laboratory

- This certificate is traceable to international system of units (SI Units).

- This certificate was certified only for the instrument we calibrated.

- This result of calibration was found accurate as shown on date and place of calibration only.

- Condition of Calibrated item : Good

UUC\* Description

Time of Record - Hour 30 Minute At 380 °C

- Result of Calibration : ☒ Without adjustment ☐ After adjustment

Certificate No.: 2302413-001-01  
Equipment: HEATING BLOCK DIGESTION  
Model: 2520 Serial No.: 91794469  
Resolution: 1 °C ID No.: UAE.WAS.011/2560  
Manufacturer: FOSS

Date of Calibration: 30-31 March 2023 Page 2 of 4

Calibration point: 380 °C

Calibration result:

## Reporting of Temperature

Block No.	UUC* Setting (°C)	UUC* Reading (°C)	Stability (±°C)	Standard Thermometer (°C)	Uncertainty (±°C)
1	380	380	0.96	377.74	2.1
2	380	380	0.40	377.28	2.1
3	380	380	1.18	377.82	2.1
4	380	380	0.44	377.19	1.6
5	380	380	0.11	377.30	1.6
6	380	380	0.14	377.90	1.6
7	380	380	1.17	373.85	2.1
8	380	380	0.33	376.96	2.1
9	380	380	0.14	374.18	2.1
10	380	380	0.96	378.56	2.0
11	380	380	1.04	378.34	2.0
12	380	380	0.35	378.05	2.0
13	380	380	0.48	377.05	1.6
14	380	380	0.38	379.19	1.6
15	380	380	0.50	377.48	1.6
16	380	380	0.48	378.33	1.7
17	380	380	0.71	377.60	1.7
18	380	380	0.35	376.77	1.7
19	380	380	0.84	377.06	1.8
20	380	380	0.41	378.58	1.8

Note:

- UUC\* = Unit Under Calibration

- Immersion depth of standard thermometer in tube level high of sand is equal heater plate of UUC.

- Stability = One-half of the greatest maximum difference of measured temperatures at one sensors, for at least half an hour after reaching steady state.

FCS-009 Revision: 01 Date: 20-04-25

FCS-009 Revision: 01 Date: 20-04-25



## Verification Report

**Certificate No.:** 2302413-001-01  
**Equipment:** HEATING BLOCK DIGESTION  
**Model:** 2520 **Serial No.:** 91794469  
**Resolution:** 1 °C **ID No.:** UAE.WAS.011/2560  
**Manufacturer:** FOSS  
**Date of Calibration:** 30-31 March 2023 **Page 4 of 4**  
**Calibration point:** 380 °C  
**Calibration result:** Continued

Figure 1. Location of Reference Standard and Block Diagram of Digestion Unit



Sensor Installation Location

**Note:**

- UUC\* = Unit Under Calibration
- Immersion depth of standard thermometer in tube level high of sand is equal heater plate of UUC.
- Stability = One-half of the greatest maximum difference of measured temperatures at one sensors, for at least half an hour after reaching steady state.

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

----- End -----

FCS-009 Revision: 01 Date: 20-04-65

## Calibration Certificate

**Certificate No.:** 2303074-001-01  
**Client name:** UNITED ANALYST AND ENGINEERING CONSULTANT CO.,LTD.  
**Address:** 3 Soi Udomsuk 41, Sukhumvit Road, Bangkok, Prakhonong, Bangkok 10260

Page 1 of 3

**Equipment:** Electronic Balance  
**Manufacturer:** METTLER TOLEDO  
**Model:** AB204-S/FACT  
**Serial No.:** 1129361010  
**ID No.:** UAE.WAS.002/2562  
**Order No.:** 2303074  
**Operation No.:** 2303074-001  
**Date of Receipt:** 26 May 2023  
**Date of Calibration:** 26 May 2023

**Calibrated by** Mr.Pheraphat Tuanjit  
Scientist

**Approved by** [Signature]  
[Signature]

Vice President, Department of Laboratory Services  
Responsible for the Technical Management Team

**Date of Issue:** 29 May 2023

The uncertainties are for a confidence probability of approximately 95%

This Certificate is issued in accordance with the conditions of accreditation granted by the Thai Laboratory Accreditation Scheme which has assessed the measurement capability of the laboratory and its traceability to recognized national standards and to the units of measurement realized at the corresponding national standards laboratory. This certificate may not be reproduced other than in full except with the prior written approval of the National Food Institute.

FCS-009 Revision: 01 Date: 20-04-65

## Calibration Report

**Certificate No.:** 2303074-001-01  
**Equipment:** Electronic Balance  
**Model:** AB204-S/FACT  
**Serial No.:** 1129361010  
**Capacity:** 220 g  
**Manufacturer:** METTLER TOLEDO  
**Resolution:** 0.0001 g  
**ID No.:** UAE.WAS.002/2562

**Date of Calibration:** 26 May 2023 **Page 2 of 3**

**Environment Condition:** Ambient Temperature: 23.7 ± 0.1 °C Relative Humidity: 61 ± 2.2 %  
**Place of Calibration:** Room 108 Balance Room, UNITED ANALYST AND ENGINEERING CONSULTANT CO.,LTD.

**Condition of Equipment:** Good Condition

**Condition of This Results of Calibration:**

1. Calibration Method: NFI Method W-404-001 In-House Method based on UWS Lab 14 : 2019

2. Reference Standards:

Reference Standard	Model	Serial No.	Calibrated By	Certificate No.	Due Date
Standard Weight Class E2	1mg to 200g	850567572	TCS	M23040535	8 April 2024
Instrument	Model	Serial No.	Calibrated By	Certificate No.	Due Date
Thermo-Hygro Meter	608-H1	NFI.BTH 018/23	Quality Reborn	QR23-0491	21 February 2024

3. This certificate is traceable to SI UNIT

4. This certificate was certified only for the instrument we calibrated.

5. This result of calibration was found accurate as shown on date and place of calibration only.

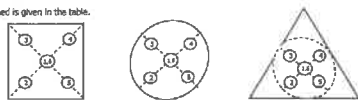
**Calibration Results:**

1. Repeatability of Reading:

Nominal Value (g)	Standard Deviation of Reading (g)
100	0.000048
200	0.000048

2. Off-Center Error:

A mass of 100 g was placed and moved to various position on pan.  
The balance reading obtained is given in the table.



1	2	3	4	5	6	(Maximum Difference)
(g)	(g)	(g)	(g)	(g)	(g)	(g)
99.9996	99.9995	99.9995	99.9999	99.9999	99.9997	0.0003

FCS-012 Revision: 01 Date: 20-04-65

## Calibration Report

**Certificate No.:** 2303074-001-01  
**Equipment:** Electronic Balance  
**Model:** AB204-S/FACT  
**Serial No.:** 1129361010  
**Capacity:** 220 g  
**Manufacturer:** METTLER TOLEDO  
**Resolution:** 0.0001 g  
**ID No.:** UAE.WAS.002/2562

**Date of Calibration:** 26 May 2023 **Page 3 of 3**

**Calibration Results:** (Continued)

**Calibration Range:** 0-200 g

**Calibration Adjustment:** Internal Calibration

3. Departure from Nominal Value:

Nominal Value	Standard Value	Average Reading	Correction	Uncertainty	Coverage Factor
(g)	(g)	(g)	(g)	(g)	k
Unladen	0.00000	0.00000	0.00000	0.000088	2.00
0.01	0.01000	0.01000	0.00000	0.000088	2.00
0.05	0.05000	0.05000	0.00000	0.000088	2.00
0.1	0.10001	0.09999	0.00001	0.000088	2.00
0.2	0.20001	0.19999	0.00001	0.000088	2.00
0.5	0.50002	0.50000	0.00000	0.000088	2.00
1	1.00000	1.00000	0.00000	0.000088	2.00
2	2.00002	2.00000	0.00000	0.000088	2.00
5	5.00002	5.00000	0.00000	0.000090	2.00
10	10.00001	9.99999	0.00001	0.000091	2.00
20	20.00003	20.00000	0.00000	0.000095	2.00
50	50.00003	49.99999	0.00001	0.000111	2.00
70	70.00006	69.99999	0.00002	0.000113	2.00
100	100.00006	99.99999	0.00002	0.000115	2.00
150	150.00009	149.99999	0.00002	0.000121	2.00
200	200.00016	199.99998	0.00004	0.000128	2.00

The reported uncertainty of measurement was based on a standard uncertainty multiplied by a coverage factor of approximately 95 %.

----- End -----

FCS-012 Revision: 01 Date: 20-04-65



Cert.No.: 23CH934  
Page: 1 of 3

## Certificate of Calibration

Equipment : pH Meter  
Manufacturer : Eosence  
Model : pH110A  
Serial No. : JC02743  
ID No. : UAE.EFM.196/2551(ENV.pH.05/61)  
Condition As-Received: Used Item  
Received Date : 25 July 2023  
Calibration Date : 28 July 2023  
Reference : 2307-0760WSC-2  
Submitted by : United Analyst and Engineering Consultant Co.,Ltd.  
3 Sol Udomsuk 41, Sukhumvit Road, Bangkok,  
Phrakhanong, Bangkok 10260  
Ambient Temperature : (25 ± 2.5) °C  
Relative Humidity : (50 ± 15) %  
Calibration Procedure : In-house method :  
- CP-CHS by direct measurement with standard  
voltage calibrator and direct measurement with  
certified reference material (CRM)  
- CP-CHS by comparison with standard thermometer

Calibrated by : Warakorn Lemgagrakul

Approved by :

( ) Malee Butiruea  
(✓) Saitip Meangmal  
( ) Warakorn Lemgagrakul

Issue Date : 27 July 2023

The Uncertainties are for a confidence probability of approximately 95%

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

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Cert.No.: 23CH934  
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	22E2769	24 Aug 2023
2) Ref. Standard Thermometer	A5A339	60RC020	2211251	11 Oct 2023

This certification is traceable to the International System of Unit maintained through-  
- Technology Promotion Association (Thailand-Japan)

2. Certified Reference Materials : 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 4.006	CPA chem	863832	28 Dec 2024
pH 8.886	CPA chem	863833	28 Dec 2023
pH 10.010	CPA chem	863835	28 Dec 2023

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 Fluke at pH (4,7)(7,10)

Unit Under Calibration	Nominal Value	Standard Voltage Input	Actual Reading		Uncertainty of Measurement (mV)	Coverage factor k
			pH	mV		
pH Meter S/N.: JC02743	4.00	177.48	177	4.01	0.58	2.00
	7.00	0.00	0	7.00	0.58	2.00
	7.00	0.00	0	7.00	0.58	2.00
	10.00	-177.48	-177	10.01	0.58	2.00

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4477454



Cert.No.: 23CH934  
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 (±)	Coverage factor k
pH Electrode S/N.:200402SIA605377	4.008	4.01	121	0.0071	2.00
	6.886	6.98	-50	0.0089	2.00
	6.986	7.00	-51	0.0089	2.00
	10.010	10.01	-228	0.0095	2.00

### Function : Temperature Measurement

(\*) Without adjustment

This equipment was connected with Temperature Probe;

- Model : -

- Serial No. : 200402SIA605377

Dimension of probe;

- Length : 120 mm

- Diameter : 12 mm

- Immersion Depth : 100 mm

Calibration Point (°C)	Standard Temperature (°C)	UUC* Reading (°C)	Error (°C)	Uncertainty of measurement (± °C)	Coverage factor k
25.0	25.002	25.0	-0.002	0.13	2.00
30.0	30.008	30.0	-0.008	0.13	2.00
35.0	35.000	35.0	0.000	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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เอกสารไม่ควบคุม

4477457



Cert. No.: 24TM303  
Page : 1 of 3

## Certificate of Calibration

Equipment : BOD Incubator  
Manufacturer : Aico  
Model : UC4-1320  
Serial No. : 13URC4S013201  
ID No. : UAE.WAO.015/2551  
Submitted by : United Analyst and Engineering Consultant Co.,Ltd.  
3 Sol Udomsuk 41, Sukhumvit Road,  
Bangchak, Phrakhanong,  
Bangkok 10260  
Location : Lab Floor 2  
Received Order : 10 February 2024  
Calibration Date : 10 February 2024  
Ambient Temperature : (26 ± 10) °C  
Relative Humidity : (50 ± 30) %  
Calibrated by : Tawatchai Pama  
Approved by :  
( ) Ponthipha Tameyakul  
(✓) Unnopphol Harachai  
( ) Suwit Injai  
Issue Date : 19 February 2024

The Uncertainties are for a confidence probability of approximately 95%

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



Equipment : BOD Incubator  
Condition As-Received : Used Item  
Reference : 2402-0234OC-1  
Result of Calibration : ( \* ) Without Adjustment  
Function of UUC\* : Temperature Source  
Fresh air setting : Not Available

Cert. No.: 24TM303  
Page : 3 of 3

Calibration Point (°C)	UUC* Setting (°C)	UUC* Reading (°C)	Temperature stability (± °C)	Temperature uniformity (°C)	Overall Variation (°C)	Coverage Factor k
20.0	20.1	19.9	0.37	0.72	1.4	2

Calibration Point ( °C )	Measured Temperature ( °C )									Uncertainty ( ± °C )
	Position									
	1	2	3	4	5	6	7	8	9 (ref.)	
20.0	19.873	19.803	20.322	19.890	19.615	19.585	19.612	19.558	19.645	0.58

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

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

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

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

UUC\* : Unit Under Calibration

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

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

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Equipment : BOD Incubator  
Condition As-Received : Used Item  
Reference : 2402-0234OC-1

Cert. No.: 24TM303  
Page : 2 of 3

Procedure Used :-

Calibration were conducted using calibration procedure CP-OT02 based on TLAS G-20 according to direct measurement method with Data Acquisition which connected with Resistance Temperature Detector ( RTD ).

The temperature scale used was based on ITS-90.

Condition of this result of calibration

1. Reference standard instrument:-

Instrument	Serial No.	Cert. No.	Traceable	Due Date
1) Data Acquisition	MY56003411	23LM208	TPA	27 Dec 2024

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

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

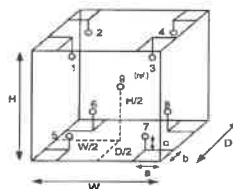
Remark : TPA : Technology Promotion Association ( Thailand - Japan )

Result of Calibration :- ( \* ) Without Adjustment

Function of UUC\* : Temperature Source

Fresh air setting : Not Available

Environment during calibration		
	Beginning	Finished
Temp. ( °C )	28	31
REL.Humid. ( % )	70	65
AC Supply ( Volt )	233	234



Probe Installation Details :

a = 10 cm  
b = 10 cm  
c = 10 cm

Dimension of Chamber :

D = 0.62 m  
W = 1.2 m  
H = 1.2 m  
Capacity = 0.88 m<sup>3</sup>

Position :	Ref. Std. ID No.:
1	20RTD-2/1
2	20RTD-2/2
3	20RTD-2/3
4	20RTD-2/4
5	20RTD-2/5
6	20RTD-2/6
7	20RTD-2/7
8	20RTD-2/8
9 (ref.)	20RTD-2/9



TECHNOLOGY PROMOTION ASSOCIATION (THAILAND-JAPAN)  
CORPORATE SERVICES 3: EQUIPMENT CALIBRATION AND TESTING SERVICES  
534/4 PATTANAKARNY ROAD SOI 18, SUANLIANG, SUANLIANG BANGKOK 10250  
TEL 0-2717-3000 FAX 0-2719-6484



## Certificate of Calibration

Cert. No.: 24TM647  
Page : 1 of 3

Equipment : Incubator  
Manufacturer : Blender  
Model : KB 400 E6  
Serial No. : 2020000015535  
ID No. : UAE.MIC.018/2564  
Submitted by : United Analyst and Engineering Consultant Co.,Ltd.  
3 Sol Udomsuk 41, Sukhumvit Road,  
Bangchak, Phrakhanong,  
Bangkok 10260  
Location : Microbiology Laboratory (302)  
Received Order : 01 April 2024  
Calibration Date : 01 April 2024  
Ambient Temperature : ( 26 ± 10 ) °C  
Relative Humidity : ( 50 ± 30 ) %  
Calibrated by : Man Pattanapongpalboon  
Approved by :  
( ) Ponpan Paipin  
( ✓ ) Suwit Imjai  
( ) Kunchit Promprat

Issue Date : 7 April 2024

The Uncertainties are for a confidence probability of approximately 95%

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Equipment : Incubator  
Condition As-Received : Used Item  
Reference : 2404-0003OC-6

Cert. No.: 24TM647  
Page : 2 of 3

Procedure Used :-

Calibration were conducted using calibration procedure CP-OT02 based on TLAS G-20 according to direct measurement method with Data Acquisition which connected with Resistance Temperature Detector ( RTD ).

The temperature scale used was based on ITS-90.

Condition of this result of calibration

1. Reference standard instrument:-

Instrument	Serial No.	Cert. No.	Traceable	Due Date
1) Data Acquisition	MY49023632	23LM122	TPA	26 Jul 2024

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

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

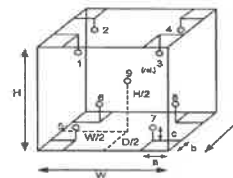
Remark : TPA : Technology Promotion Association ( Thailand - Japan )

Result of Calibration :- ( \* ) Without Adjustment

Function of UUC\* : Temperature Source

Fresh air setting : Close

Environment during calibration		
	Beginning	Finished
Temp. ( °C )	24	24
REL.Humid. ( % )	54	57
AC Supply ( Volt )	221	223



Probe Installation Details :

a = 10 cm  
b = 10 cm  
c = 10 cm

Dimension of Chamber :

D = 0.48 m  
W = 0.65 m  
H = 1.2 m  
Capacity = 0.37 m<sup>3</sup>

Position :	Ref. Std. ID No.:
1	20-18RTD-01
2	20-18RTD-02
3	20-18RTD-03
4	23-18RTD-04
5	22-16RTD-05
6	20-16RTD-06
7	20-16RTD-07
8	22-16RTD-08
9 (ref.)	22-16RTD-09

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Equipment : Incubator  
Condition As-Received : Used Item  
Reference : 2404-0003OC-6  
Result of Calibration : ( ° ) Without Adjustment  
Function of UUC\* : Temperature Source  
Fresh air setting : Close

Cert. No.: 24TM847  
Page : 3 of 3

Calibration Point (°C)	UUC* Setting (°C)	UUC* Reading (°C)	Temperature stability (± °C)	Temperature uniformity (°C)	Overall Variation (°C)	Coverage Factor k
35.0	35.0	35.0	0.035	0.19	0.22	2

Calibration Point (°C)	Measured Temperature (°C)									Uncertainty (± °C)
	Position									
35.0	1	2	3	4	5	6	7	8	9 (ref.)	
	35.000	35.022	34.841	34.851	35.027	35.011	35.023	35.028	35.007	0.30

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

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

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

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

UUC\* : Unit Under Calibration

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

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

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เอกสารไม่ควบคุม



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

Cert.No.: 24TW99  
Page.: 1 of 2

## Certificate of Testing

Equipment : DO Meter  
Manufacturer : YSI  
Model : 5100  
Serial No. : 11B 101883  
ID No. : UAE.WAO.004/2554  
Received Date : 20 February 2024  
Test Date : 21 February 2024  
Reference : 2402-06280SC-1  
Submitted by : United Analyst and Engineering Consultant Co.,Ltd.  
3 Soi Udomsuk 41, Sukhumvit Road, Bangchak, Phraekhanong, Bangkok 10260  
Laboratory Condition : Temperature ( 25 ± 5 ) °C  
Humidity ( 50 ± 20 ) %  
Test Procedure : In - house method : CP-CH9  
by Comparison Technique with Azide Modification Method

Tested by : Walakol Sittiboon

Approved by :

( ) Pornthippa Tameyakul  
( ) Unnopphol Harachei  
(✓) Saithip Meangmal

Issue Date : 22 February 2024

เอกสารไม่ควบคุม



Cert.No.: 24TW39  
Page.: 2 of 2

### Condition of this result of calibration

#### 1. Reference Standard Instruments :

This certification is traceable to the International System of Unit through the reference standards laboratory of Industrial Calibration Center, Technology Promotion Association (Thailand-Japan).

Instruments	Serial No.	ID No.	Certificate No.	Due Date
1. Burette	-	130BU10	23CG1172	22 Mar 2025
2. Balance	14233821	110RC001	23MM4405	16 July 2024

#### 2. Standard Material :-

Material	Manufacturer	Lot.No.	Assay
Sodium Thiosulfate pentahydrate	Merck	AM1763316	100.2%

Result : Dissolved Oxygen Meter Adjustment With Air 100 %  
Dissolved Oxygen Probe No.: 22B100125

Titration Method (Azide Modification Method) (mg/L)	DO Meter Reading (mg/L)	Standard Deviation (mg/L)
8.20	8.19	0.0055

This report was certified only for the instrument we tested. It is allowable to use for study  
Intend to use for advertising and referral purpose is prohibited. This report may not be reproduced  
other in full, without written approval of the laboratory

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มูลนิธิสถาบันวิจัยและพัฒนาอุตสาหกรรม  
ศูนย์บริการห้องปฏิบัติการอุตสาหกรรมอาหาร  
Foundation for Industrial Development National Food Institute  
Food Industrial Laboratory Service Center



## Calibration Certificate

Certificate No.: 2303074-001-01  
Client name: UNITED ANALYST AND ENGINEERING CONSULTANT CO.,LTD.  
Address: 3 Soi Udomsuk 41, Sukhumvit Road,  
Bangchak, Phraekhanong, Bangkok 10260

Page 1 of 3

Equipment: Electronic Balance  
Manufacturer: METTLER TOLEDO  
Model: AB204-S/FACT  
Serial No.: 1129361010  
ID No.: UAE.WAS.002/2552  
Order No.: 2303074  
Operation No.: 2303074-001  
Date of Receipt: 26 May 2023  
Date of Calibration: 26 May 2023

Calibrated by Mr.Pheraphat Tuanjit  
Scientist

Approved by  
(Signature)

Vice President  
Responsible for the Technical Management Team

Date of Issue: 29 May 2023

The uncertainties are for a confidence probability of approximately 95%

This Certificate is issued in accordance with the conditions of accreditation granted by the Thai Laboratory Accreditation Scheme which has assessed the measurement capability of the laboratory and its traceability to recognized national standards and to the units of measurement realized at the corresponding national standards laboratory. This certificate may not be reproduced other than in full, except with the prior written approval of the National Food Institute.

FCS-009 Revision: 01 Date: 20-01-63

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มูลนิธิพัฒนาอุตสาหกรรมอาหาร  
ศูนย์บริการวิชาการ  
Foundation for Industrial Development National Food Institute  
Food Industrial Laboratory Service Center



MAC  
METTLER TOLEDO  
CALIBRATION 001

## Calibration Report

Certificate No.: 2303074-001-01

Equipment: Electronic Balance

Manufacturer: METTLER TOLEDO

Model: AB204-S/FACT

Resolution: 0.0001 g

Serial No.: 1129361010

ID No.: UAE.WAS.002/2552

Capacity: 220 g

Date of Calibration: 26 May 2023

Page 2 of 3

Environment Condition: Ambient Temperature:  $23.7 \pm 0.1$  °C Relative Humidity:  $61 \pm 2.2$  %

Place of Calibration: Room 108 Balance Room, UNITED ANALYST AND ENGINEERING CONSULTANT CO., LTD.

Condition of Equipment: Good Condition

Condition of This Results of Calibration:

1. Calibration Method: NFI Method W-MA-001 In-House Method based on UKAS Lab 14 : 2019

2. Reference Standards:

Reference Standard	Model	Serial No.	Calibrated By	Certificate No.	Due Date
Standard Weight Class E2	1mg to 200g	B505567572	TCS	M23040535	8 April 2024
Instrument	Model	Serial No.	Calibrated By	Certificate No.	Due Date
Thermo-Hygro Meter	608-H1	NFI.BTH 018/23	Quality Reborn	QR23-0491	21 February 2024

3. This certification is traceable to SI UNIT

4. This certificate was certified only for the instrument was calibrated.

5. This result of calibration was found accurate as shown on date and place of calibration only.

Calibration Results:

1. Repeatability of Reading:

Nominal Value (g)	Standard Deviation of Reading (g)
100	0.000048
200	0.000048

2. Off-Center Error:

A mass of 100 g was placed and moved to various position on pan.

The balance reading obtained is given in the table.

1	2	3
4	5	6
(g)	(g)	(g)
99.9996	99.9995	99.9995
(g)	(g)	(g)
99.9999	99.9999	99.9997
(Maximum Difference)		
0.0003		

F-CS-012 Revision: 01 Date: 20-04-65



มูลนิธิพัฒนาอุตสาหกรรมอาหาร  
ศูนย์บริการวิชาการ  
Foundation for Industrial Development National Food Institute  
Food Industrial Laboratory Service Center



MAC  
METTLER TOLEDO  
CALIBRATION 001

## Calibration Report

Certificate No.: 2303074-001-01

Equipment: Electronic Balance

Manufacturer: METTLER TOLEDO

Model: AB204-S/FACT

Resolution: 0.0001 g

Serial No.: 1129361010

ID No.: UAE.WAS.002/2552

Capacity: 220 g

Date of Calibration: 26 May 2023

Page 3 of 3

Calibration Results: (Continued)

Calibration Range: 0-200 g

Calibration Adjustment: Internal Calibration

3. Departure from Nominal Value:

Nominal Value	Standard Value	Average Reading	Correction	Uncertainty	Coverage Factor
Unloaded	0.00000	0.00000	0.00000	0.000088	2.00
0.01	0.01000	0.01000	0.00000	0.000088	2.00
0.05	0.05000	0.05000	0.00000	0.000088	2.00
0.1	0.10001	0.09999	0.00001	0.000088	2.00
0.2	0.20001	0.19999	0.00001	0.000088	2.00
0.5	0.50002	0.50000	0.00000	0.000088	2.00
1	1.00000	1.00000	0.00000	0.000088	2.00
2	2.00002	2.00000	0.00000	0.000088	2.00
5	5.00002	5.00000	0.00000	0.000088	2.00
10	10.00001	9.99999	0.00001	0.000091	2.00
20	20.00003	20.00000	0.00000	0.000095	2.00
50	50.00003	49.99999	0.00001	0.00011	2.00
70	70.00005	69.99999	0.00002	0.00011	2.00
100	100.00006	99.99999	0.00002	0.00016	2.00
150	150.00009	149.99999	0.00002	0.00021	2.00
200	200.00016	199.99999	0.00004	0.00028	2.00

The reported uncertainty of measurement was based on a standard uncertainty multiplied by a coverage factor of approximately 95 %.

----- End -----

F-CS-012 Revision: 01 Date: 20-04-65



มูลนิธิพัฒนาอุตสาหกรรมอาหาร  
ศูนย์บริการวิชาการ  
Foundation for Industrial Development National Food Institute  
Food Industrial Laboratory Service Center



MAC  
METTLER TOLEDO  
CALIBRATION 001

## Calibration Certificate

Certificate No.: 2402283-001-01

Client name: UNITED ANALYST AND ENGINEERING CONSULTANT CO., LTD.

Address: 3 Soi Udomsak 41, Sukhumvit Road, Bangchack, Prakhonong, Bangkok 10260

Page 1 of 4

Equipment: Electronic Balance

Manufacturer: METTLER TOLEDO

Model: XSR205DU

Serial No.: C009071872

ID No.: UAE.WAO.012/2563

Order No.: 2402283

Operation No.: 2402283-001

Date of Receipt: 2 April 2024

Date of Calibration: 2 April 2024

Calibrated by Mr.Jerawut Prapawuttipong

Approved by

Scientist

( Mr.Pr

Manager, Division of Calibration Laboratory

Date of Issue: 9 April 2024

Responsible for the Technical Management Team

The uncertainties are for a confidence probability of approximately 95%

This Certificate is issued in accordance with the conditions of accreditation granted by the Thai Laboratory Accreditation Scheme which has assessed the measurement capability of the laboratory and its traceability to recognized national standards and to the units of measurement realized at the corresponding national standards laboratory. This certificate may not be reproduced other than in full except with the prior written approval of the National Food Institute.

F-CS-009 Revision: 01 Date: 20-04-65



มูลนิธิพัฒนาอุตสาหกรรมอาหาร  
ศูนย์บริการวิชาการ  
Foundation for Industrial Development National Food Institute  
Food Industrial Laboratory Service Center



MAC  
METTLER TOLEDO  
CALIBRATION 001

## Calibration Report

Certificate No.: 2402283-001-01

Equipment: Electronic Balance

Manufacturer: METTLER TOLEDO

Model: XSR205DU

Resolution: 0.0001 g / 0.0001 g

Serial No.: C009071872

ID No.: UAE.WAO.012/2563

Capacity: 220 g

Date of Calibration: 2 April 2024

Page 2 of 4

Environment Condition: Ambient Temperature:  $24.5 \pm 0.5$  °C Relative Humidity:  $47.5 \pm 2.5$  %

Place of Calibration: Laboratory, UNITED ANALYST AND ENGINEERING CONSULTANT CO., LTD.

Condition of Equipment: Good Condition

Condition of This Results of Calibration:

1. Calibration Method: NFI Method W-MA-001 In-House Method based on UKAS Lab 14 : 2019

2. Reference Standards:

Reference Standard	Model	Serial No.	Calibrated By	Certificate No.	Due Date
Standard Weight Class E2	1mg to 200g	B505567572	TCS	M23040535	8 April 2024
Instrument	Model	Serial No.	Calibrated By	Certificate No.	Due Date
Thermo-Hygro Meter	608-H1	NFI.BTH 018/23	Quality Reborn	QR24-0343	9 February 2025

3. This certification is traceable to SI UNIT

4. This certificate was certified only for the instrument we calibrated.

5. This result of calibration was found accurate as shown on date and place of calibration only.

Calibration Results:

1. Repeatability of Readings:

Nominal Value (g)	Standard Deviation of Reading (g)
40	0.000052
80	0.000053
100	0.000048
200	0.000053

2. Off-Center Error:

A mass of 100 g was placed and moved to various position on pan.

The balance reading obtained is given in the table.

1	2	3
4	5	6
(g)	(g)	(g)
100.00002	100.00001	100.00002
99.99999	100.00001	100.00001
(Maximum Difference)		
0.00003		

F-CS-012 Revision: 01 Date: 20-04-65



ศูนย์บริการและทดสอบมาตรฐาน  
Foundation for Industrial Development National Food Institute  
Food Industrial Laboratory Service Center



## Calibration Report

Certificate No.: 2402283-001-01  
Equipment: Electronic Balance  
Manufacturer: METTLER TOLEDO  
Model: XSR205DU  
Resolution: 0.0001 g / 0.0001 g  
Serial No.: C009071872  
ID No.: UAE.WAO.012/2563  
Capacity: 220 g

Date of Calibration: 2 April 2024 Page 3 of 4

Calibration Results: (Continued)

Calibration Range: 0 - 80 g

Calibration Adjustment: Internal Calibration

3. Departure from Nominal Value: (Range: 0 - 80 g; Resolution: 0.00001 g)

Nominal Value (g)	Standard Value (g)	Average Reading (g)	Correction (g)	Uncertainty (g)	Coverage Factor k
Unload	0.00000	0.00000	0.00000	0.0000088	2.00
0.001	0.001002	0.00101	-0.00001	0.0000091	2.00
0.005	0.005003	0.00500	0.00001	0.0000094	2.00
0.01	0.010003	0.01000	0.00001	0.0000091	2.00
0.05	0.050006	0.05000	0.00001	0.0000098	2.00
0.1	0.100013	0.10000	0.00001	0.000011	2.00
0.5	0.500016	0.50001	0.00001	0.000014	2.00
1	1.00003	1.00002	-0.00002	0.000016	2.00
2	2.000023	2.00001	0.00001	0.000017	2.00
5	5.000017	5.00002	0.00000	0.000020	2.00
10	10.000009	10.00000	0.00001	0.000026	2.00
20	20.000031	20.00002	0.00001	0.000037	2.00
20	20.000040	20.00003	0.00001	0.000033	2.00
50	50.000028	50.00004	-0.00001	0.000068	2.00
80	80.000068	80.00006	0.00002	0.00011	2.00

FCS-012 Revision: 01 Date: 20-04-65



ศูนย์บริการและทดสอบมาตรฐาน  
Foundation for Industrial Development National Food Institute  
Food Industrial Laboratory Service Center



## Calibration Report

Certificate No.: 2402283-001-01  
Equipment: Electronic Balance  
Manufacturer: METTLER TOLEDO  
Model: XSR205DU  
Resolution: 0.0001 g / 0.0001 g  
Serial No.: C009071872  
ID No.: UAE.WAO.012/2563  
Capacity: 220 g

Date of Calibration: 2 April 2024 Page 4 of 4

Calibration Results: (Continued)

Calibration Range: 81 - 200 g

Calibration Adjustment: Internal Calibration

3. Departure from Nominal Value: (Range: 81 - 200 g; Resolution: 0.0001 g)

Nominal Value (g)	Standard Value (g)	Average Reading (g)	Correction (g)	Uncertainty (g)	Coverage Factor k
90	90.00010	90.0000	0.0001	0.00015	2.00
100	100.00005	100.0000	0.0001	0.00015	2.00
110	110.00007	110.0001	0.0000	0.00017	2.00
120	120.00009	120.0000	0.0001	0.00018	2.00
130	130.00010	130.0000	0.0001	0.00019	2.00
140	140.00014	140.0000	0.0001	0.00020	2.00
150	150.00009	150.0001	0.0000	0.00020	2.00
160	160.00010	160.0001	0.0000	0.00022	2.00
170	170.00012	170.0001	0.0000	0.00023	2.00
200	200.00016	200.0000	0.0002	0.00028	2.00

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 %.

FCS-012 Revision: 01 Date: 20-04-65



TECHNOLOGY PROMOTION ASSOCIATION (THAILAND-JAPAN)  
CORPORATE SERVICES 3: EQUIPMENT CALIBRATION AND TESTING SERVICES  
5344 PATTANAKARN ROAD SOI 18, SIAMLIANG, SIAMLIANG BANGKOK 10250  
TEL: 0-2017-3000-29 FAX: 0-2719-9464



## Certificate of Calibration

Equipment: pH Meter  
Manufacturer: Horiba  
Model: LAQUA-PH210  
Serial No.: HADE0008  
ID No.: UAE.EFM.071/2564(EFM.pH.04/64)  
Condition As-Received:  
Received Date: 19 February 2024  
Calibration Date: 20 February 2024  
Reference: 2402-0594-WC-2  
Submitted by: United Analyt and Engineering Consultant Co., Ltd.  
3 Sol Udomsuk 41, Sukhumvit Road, Bangkok,  
Phrakhanong, Bangkok 10260  
Ambient Temperature: (25 ± 2.5) °C  
Relative Humidity: (50 ± 15) %  
Calibration Procedure: In-house method:  
- CP-CH5 by direct measurement with  
DC Voltage Standard and direct measurement  
with certified reference material (CRM)  
- CP-CH5 by comparison with temperature standard

Calibrated by: Walailak Sirthean

Approved by: Approved Signatory

( ) Ponthipha Tameyakul  
( ) Unnopphol Harachai  
(✓) Sathip Meangmai

Issue Date: 22 February 2024

The Uncertainties are for a confidence probability of approximately 95%

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

A 0063840



### Condition of this calibration result

#### 1. Reference Standard Instrument

##### Instrument

Instrument	Serial No.	ID No.	Cert. No.	Due Date
1) Document Process Calibrator	54030049	130RC116	23E2802	27 Aug 2024
2) Ref. Standard Thermometer	4982054	110RC044	23E008	26 July 2024

This certification is traceable to the International System of Unit maintained through:  
- Technology Promotion Association (Thailand-Japan)

#### 2. Certified Reference Materials

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 4.008	CPA chem	940102	27 Nov 2025
pH 6.868	CPA chem	940104	02 Nov 2024
pH 9.997	CPA chem	940105	02 Nov 2024

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 (±mV)	Coverage factor k
			mV	pH		
pH Meter S/N: HADE0008	4.00	177.48	177.4	4.01	0.058	2.00
	7.00	0.00	0.0	7.00	0.058	2.00
	7.00	0.00	0.0	7.00	0.058	2.00
	10.00	-177.48	-177.4	10.01	0.058	2.00

a 1203153





Cert.No.: 24CH238  
Page.: 3 of 3

#### Calibration Results

Function : pH Measurement

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

Unit Under Calibration	Standard pH Buffer Solution	Actual pH Reading	Actual mV Reading (mV)	Uncertainty of pH Measurement (Δ)	Coverage factor k
pH Electrode S/N.: 992C0006	4.008	4.02	149.4	0.0086	2.06
	6.866	7.00	-24.4	0.0093	2.00
	6.986	7.00	-25.0	0.0093	2.00
	9.997	10.00	-196.7	0.0085	2.00

Function : Temperature Measurement

(\*) Without adjustment

This equipment was connected with Temperature Probe:

- Model : 9625  
- Serial No. : 992C0006

Dimension of probe

- Length : 110 mm.  
- Diameter : 16 mm.  
- Immersion Depth : 100 mm.

Calibration Point (°C)	Standard Temperature (°C)	UUC* Reading (°C)	Error (°C)	Uncertainty of measurement (± °C)	Coverage factor k
25.0	25.000	25.0	0.000	0.13	2.00
30.0	30.000	30.0	0.000	0.13	2.00
35.0	34.999	35.0	0.001	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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α 1203293



TECHNOLOGY PROMOTION ASSOCIATION (THAILAND-JAPAN)  
CORPORATE SERVICES 3: EQUIPMENT CALIBRATION AND TESTING SERVICES  
33/4 PATTAYAKARN ROAD SOI 18, SUANLUANG, SUANLUANG BANGKOK 10230  
TEL. 0-2717-3066-29 FAX. 0-2719-9-84



Cert. No.: 24TM589  
Page : 1 of 3

## Certificate of Calibration

Equipment : Hot Air Oven  
Manufacturer : Mammert  
Model : UF 55  
Serial No. : B212.0411  
ID No. : UAE.WAO.0052556  
Submitted by : United Analyst and Engineering Consultant Co.,Ltd.  
3 Soi Udomsuk 41, Sukhumvit Road,  
Bangchak, Phrakhanong,  
Bangkok 10260  
Location : Lab Floor 2  
Received Order : 01 April 2024  
Calibration Date : 01 - 02 April 2024  
Ambient Temperature : ( 20 ± 10 ) °C  
Relative Humidity : ( 50 ± 30 ) %  
Calibrated by : Krisda Malee  
Approved by :  
( ) Ponpan Palpim  
(✓) Suwit Imjai  
( ) Kunchit Promrat

Issue Date : 5 April 2024

The Uncertainties are for a confidence probability of approximately 95%

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

เอกสารไม่ควบคุม  
A 0065065



Equipment : Hot Air Oven  
Condition As-Received : Used Item  
Reference : 2404-0004-CC-3

Cert.No.: 24TM589  
Page : 2 of 3

Procedure Used :-

Calibration were conducted using calibration procedure CP-OT02 based on TLAS G-20 according to direct measurement method with Data Acquisition which connected with Resistance Temperature Detector (RTD) and Thermocouple Type T.

The temperature scale used was based on ITS-90.

Condition of this result of calibration

1. Reference standard instrument:-

Instrument Serial No. Cert. No. Traceable Due Date  
1) Data Acquisition MY57013711 23LM115 TPA 11 Jul 2024

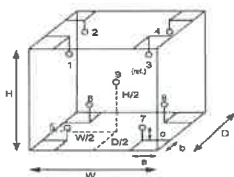
2. This certificate is valid only to the item calibrated on date and place of calibration.  
3. This certification is traceable to the International System of Unit.

Remark : TPA: Technology Promotion Association (Thailand - Japan)

Result of Calibration :- (\*) Without Adjustment

Function of UUC\* : Temperature Source

Fresh air setting : Close



Probe Installation Details : Dimension of Chamber :  
a = 5.0 cm D = 0.50 m  
b = 5.0 cm W = 0.80 m  
c = 5.0 cm H = 0.75 m  
Capacity = 0.30 m³

Environment during calibration		
	Beginning	Finished
Temp. (°C)	27	26
REL.Humid. (%)	47	48
AC Supply ( Volt )	221	220

Ref. Std. ID No.: @ Calibration Point		
Position :	(120 to 180) °C	(104) °C
1	21-18TC-01	22-18RTD-2/1
2	21-18TC-02	18RTD-2/2
3	21-18TC-03	18RTD-2/3
4	21-18TC-04	18RTD-2/4
5	21-18TC-05	18RTD-2/5
6	21-18TC-06	18RTD-2/6
7	21-18TC-07	18RTD-2/7
8	21-18TC-08	18RTD-2/8
9 (ref.)	21-18TC-09	18RTD-2/9

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เอกสารไม่ควบคุม  
α 1209739



Equipment : Hot Air Oven  
Condition As-Received : Used Item  
Reference : 2404-0004-CC-3  
Result of Calibration :- (\*) Without Adjustment  
Function of UUC\* : Temperature Source  
Fresh air setting : Close

Cert. No.: 24TM589  
Page : 3 of 3

Calibration Point (°C)	UUC* Setting (°C)	UUC* Reading (°C)	Temperature stability (± °C)	Temperature uniformity (°C)	Overall Variation (°C)	Coverage Factor k
104.0	104.0	104.0	0.032	0.47	0.84	2
120.0	120.0	120.0	0.12	0.72	1.3	2
180.0	180.0	180.0	0.13	1.2	1.5	2

Calibration Point (°C)	Measured Temperature (°C)									Uncertainty (± °C)
	1	2	3	4	5	6	7	8	9 (ref.)	
104.0	104.464	103.847	104.226	104.232	104.106	103.691	104.275	104.127	104.013	0.42
120.0	120.486	120.089	120.635	120.596	119.531	119.644	120.364	120.144	120.158	1.1
180.0	180.574	179.769	180.285	180.670	179.594	179.790	180.287	179.961	179.802	1.1

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

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

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

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

UUC\* : Unit Under Calibration

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

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

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เอกสารไม่ควบคุม  
α 1209738



## Certificate of Calibration

Cert. No.: 24TM847  
Page : 1 of 3

Equipment : Incubator  
Manufacturer : Binder  
Model : KB 400 E8  
Serial No. : 2020000015535  
ID No. : UAE.MIC.018/2564  
Submitted by : United Analyst and Engineering Consultant Co., Ltd.  
3 Soi Udomsuk 41, Sukhumvit Road,  
Bangchak, Phrakhanong,  
Bangkok 10260  
Location : Microbiology Laboratory (302)  
Received Order : 01 April 2024  
Calibration Date : 01 April 2024  
Ambient Temperature :  $(25 \pm 10) ^\circ\text{C}$   
Relative Humidity :  $(50 \pm 30) \%$   
Calibrated by : Man Pattanapongpalboon  
Approved by :  
( ) Ponpan Palpim  
(✓) Suwit Imjai  
( ) Kunchit Promprat

Issue Date : 7 April 2024

The Uncertainties are for a confidence probability of approximately 95%

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

เอกสารไม่ควบคุม



Equipment : Incubator  
Condition As-Received : Used Item  
Reference : 2404-0003OC-6  
Procedure Used :-

Cert. No.: 24TM647  
Page : 2 of 3

Calibration were conducted using calibration procedure CP-OT02 based on TLAS G-20 according to direct measurement method with Data Acquisition which connected with Resistance Temperature Detector (RTD).  
The temperature scale used was based on ITS-90.

### Condition of this result of calibration

#### 1. Reference standard Instrument-

Instrument	Serial No.	Cert. No.	Traceable	Due Date
1) Data Acquisition	MY49023932	23LM122	TPA	26 Jul 2024

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

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

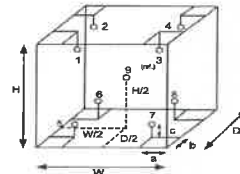
Remark : TPA : Technology Promotion Association (Thailand - Japan)

Result of Calibration :- ( ) Without Adjustment

Function of UUC\* : Temperature Source

Fresh air setting : Close

Environment during calibration		
	Beginning	Finished
Temp. (°C)	24	24
REL Humid. (%)	54	57
AC Supply (Volt)	221	223



#### Probe Installation Details :

a = 10 cm  
b = 10 cm  
c = 10 cm

#### Dimension of Chamber :

D = 0.48 m  
W = 0.65 m  
H = 1.2 m  
Capacity = 0.37 m<sup>3</sup>

Position :	Ref. Std. ID No.:
1	20-16RTD-01
2	20-16RTD-02
3	20-16RTD-03
4	23-16RTD-04
5	22-16RTD-05
6	20-16RTD-06
7	20-16RTD-07
8	22-16RTD-08
9 (ref.)	22-16RTD-09

เอกสารไม่ควบคุม



Equipment : Incubator  
Condition As-Received : Used Item  
Reference : 2404-0003OC-6  
Result of Calibration :- ( ) Without Adjustment  
Function of UUC\* : Temperature Source  
Fresh air setting : Close

Cert. No.: 24TM647  
Page : 3 of 3

Calibration Point (°C)	UUC* Setting (°C)	UUC* Reading (°C)	Temperature stability (± °C)	Temperature uniformity (°C)	Overall Variation (°C)	Coverage Factor k
35.0	35.0	35.0	0.035	0.19	0.22	2

Calibration Point (°C)	Measured Temperature (°C)									Uncertainty (± °C)
	1	2	3	4	5	6	7	8	9 (ref.)	
35.0	35.000	35.022	34.841	34.851	35.027	35.011	35.023	35.028	35.007	0.30

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

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

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

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

UUC\* : Unit Under Calibration

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

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

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เอกสารไม่ควบคุม



Cert.No.: 24TW39  
Page.: 1 of 2

## Certificate of Testing

Equipment : DO Meter  
Manufacturer : YSI  
Model : 5100  
Serial No. : 11B 101853  
ID No. : UAE.WAO.004/2554  
Received Date : 20 February 2024  
Test Date : 21 February 2024  
Reference : 2402-0629DSC-1  
Submitted by : United Analyst and Engineering Consultant Co., Ltd.  
3 Soi Udomsuk 41, Sukhumvit Road, Bangchak,  
Phrakhanong, Bangkok 10260  
Laboratory Condition : Temperature  $(25 \pm 5) ^\circ\text{C}$   
Humidity  $(50 \pm 20) \%$   
Test Procedure : In-house method : CP-CH9  
by Comparison Technique with Azide Modification Method  
Tested by : Walalak Sittthean  
Approved by :  
( ) Pornthippa Tameyakul  
( ) Unnopphol Harachai  
(✓) Sathip Meangmai

Issue Date : 22 February 2024

เอกสารไม่ควบคุม



Cert.No.: 24TW39  
Page: 2 of 2

#### Condition of this result of calibration

##### 1. Reference Standard Instruments :

This certification is traceable to the International System of Unit through the reference standards laboratory of Industrial Calibration Center, Technology Promotion Association (Thailand-Japan).

Instruments	Serial No.	ID No.	Certificate No.	Due Date
1. Burette	-	1308U10	23CG1172	22 Mar 2025
2. Balance	14233821	110RC001	23MM405	16 July 2024

##### 2. Standard Material :-

Material	Manufacturer	Lot No.	Assay
Sodium Thiosulfate pentahydrate	Merck	AM1763316	100.2%

**Result :** Dissolved Oxygen Meter Adjustment With Air 100 %  
Dissolved Oxygen Probe No.: 229100125

Titration Method (Azide Modification Method) (mg/L)	DO Meter Reading (mg/L)	Standard Deviation (mg/L)
8.20	8.19	0.0056

This report was certified only for the instrument we tested. It is allowable to use for study intend to use for advertising and referral purpose is prohibited. This report may not be reproduced other in full without written approval of the laboratory

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## Calibration Certificate

**Certificate No.:** 2303074-001-01  
**Client name:** UNITED ANALYST AND ENGINEERING CONSULTANT CO.,LTD.  
**Address:** 3 Soi Udomsuk 41, Sukhumvit Road,  
Bangchack, Prakhnong, Bangkok 10260

Page 1 of 3

**Equipment:** Electronic Balance

**Manufacturer:** METTLER TOLEDO

**Model:** AB204-S/FACT

**Serial No.:** 1129361010

**ID No.:** UAE.WAS.002/2552

**Order No.:** 2303074

**Operation No.:** 2303074-001

**Date of Receipt:** 26 May 2023

**Date of Calibration:** 26 May 2023

**Calibrated by** Mr.Pheraphat Tuanjit  
Scientist

**Approved by** [Signature]  
Vice President, Department of Laboratory Services  
Responsible for the Technical Management Team

**Date of Issue:** 29 May 2023

The uncertainties are for a confidence probability of approximately 95%

This Certificate is issued in accordance with the conditions of accreditation granted by the Thai Laboratory Accreditation Scheme which has assessed the measurement capability of the laboratory and its traceability to recognized national standards and to the units of measurement realized at the corresponding national standards laboratory. This certificate may not be reproduced other than in full except with the prior written approval of the National Food Institute.

FCS-009 Revision: 01 Date: 20-04-65



อุตสาหกรรมพัฒนาเทคโนโลยีอาหาร  
ศูนย์บริการทดสอบปฏิบัติการอุตสาหกรรมอาหาร  
Foundation for Industrial Development National Food Institute  
Food Industrial Laboratory Service Center



## Calibration Report

**Certificate No.:** 2303074-001-01  
**Equipment:** Electronic Balance  
**Manufacturer:** METTLER TOLEDO  
**Model:** AB204-S/FACT  
**Resolution:** 0.0001 g  
**Serial No.:** 1129361010  
**ID No.:** UAE.WAS.002/2552  
**Capacity:** 220 g

**Date of Calibration:** 26 May 2023

Page 2 of 3

**Environment Condition:** Ambient Temperature: 23.7 ± 0.1 °C Relative Humidity: 61 ± 2.2 %

**Place of Calibration:** Room 108 Balance Room, UNITED ANALYST AND ENGINEERING CONSULTANT CO.,LTD.

**Condition of Equipment:** Good Condition

#### Condition of This Results of Calibration:

1. Calibration Method: NFI Method W-HA-001 In-House Method based on UKAS Lab 14 : 2019

2. Reference Standards:

Reference Standard	Model	Serial No.	Calibrated By	Certificate No.	Due Date
Standard Weight Class E2	1mg to 200g	R50567572	TCS	M23040535	8 April 2024
Instrument	Model	Serial No.	Calibrated By	Certificate No.	Due Date
Thermo-Hygro Meter	606-H1	NFI.BTH D14/23	Quality Reborn	QR23-0491	21 February 2024

3. This certification is traceable to SI UNIT

4. This certificate was certified only for the instrument we calibrated.

5. This result of calibration was found accurate as shown on date and place of calibration only.

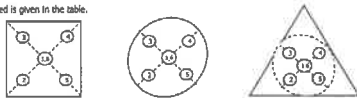
#### Calibration Results:

##### 1. Repeatability of Reading:

Nominal Value (g)	Standard Deviation of Reading (g)
100	0.003048
200	0.003048

##### 2. Off-Center Error:

A mass of 100 g was placed and moved to various position on pan.  
The balance reading obtained is given in the table.



1	2	3	4	5	6	(Maximum Difference)
(g)	(g)	(g)	(g)	(g)	(g)	(g)
99.9996	99.9995	99.9995	99.9999	99.9999	99.9997	0.0003

FCS-012 Revision: 01 Date: 20-04-65



## Calibration Report

**Certificate No.:** 2303074-001-01  
**Equipment:** Electronic Balance  
**Manufacturer:** METTLER TOLEDO  
**Model:** AB204-S/FACT  
**Resolution:** 0.0001 g  
**Serial No.:** 1129361010  
**ID No.:** UAE.WAS.002/2552  
**Capacity:** 220 g

**Date of Calibration:** 26 May 2023

Page 3 of 3

**Calibration Results:** (Continued)

**Calibration Range:** 0-200 g

**Calibration Adjustment:** Internal Calibration

3. Departure from Nominal Value:

Nominal Value (g)	Standard Value (g)	Average Reading (g)	Correction (g)	Uncertainty (g)	Coverage Factor
Unread	0.00000	0.0000	0.0000	0.000088	2.00
0.01	0.01000	0.0100	0.0000	0.000088	2.00
0.05	0.05000	0.0500	0.0000	0.000088	2.00
0.1	0.10001	0.0999	0.0001	0.000088	2.00
0.2	0.20001	0.1999	0.0001	0.000088	2.00
0.5	0.50002	0.5000	0.0000	0.000088	2.00
1	1.00002	1.0000	0.0000	0.000088	2.00
2	2.00002	2.0000	0.0000	0.000088	2.00
5	5.00002	5.0000	0.0000	0.000090	2.00
10	10.00001	9.9999	0.0001	0.000091	2.00
20	20.00003	20.0000	0.0000	0.000095	2.00
50	50.00002	49.9999	0.0001	0.00011	2.00
70	70.00004	69.9999	0.0001	0.00013	2.00
100	100.00006	99.9999	0.0001	0.00016	2.00
150	150.00008	149.9999	0.0001	0.00021	2.00
200	200.00016	199.9998	0.0004	0.00028	2.00

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

End

FCS-012 Revision: 01 Date: 20-04-65

## Calibration Certificate

Certificate No.: 2402283-001-01  
Client name: UNITED ANALYST AND ENGINEERING CONSULTANT CO., LTD.  
Address: 3 Soi Udomsuk 43, Sukhumvit Road,  
Bangchack, Prakhonong, Bangkok 10260

Page 1 of 4

Equipment: Electronic Balance

Manufacturer: METTLER TOLEDO

Model: XSR205DU

Serial No.: C009071872

ID No.: UAE.WAO.012/2563

Order No.: 2402283

Operation No.: 2402283-001

Date of Receipt: 2 April 2024

Date of Calibration: 2 April 2024

Calibrated by Mr.Jerawut Prapawuttipong  
Scientist  
Approved by (Mr.Pheraphat Tuanjit)  
Manager, Division of Calibration Laboratory  
Responsible for the Technical Management Team

Date of Issue: 9 April 2024

The uncertainties are for a confidence probability of approximately 95%

This Certificate is issued in accordance with the conditions of accreditation granted by the Thai Laboratory Accreditation Scheme which has assessed the measurement capability of the laboratory and its traceability to recognized national standards and to the units of measurement realized at the corresponding national standards laboratory. This certificate may not be reproduced other than in full except with the prior written approval of the National Food Institute.

F-CS-009 Revision: 01 Date: 20-04-65

## Calibration Report

Certificate No.: 2402283-001-01  
Equipment: Electronic Balance  
Manufacturer: METTLER TOLEDO  
Model: XSR205DU  
Serial No.: C009071872  
ID No.: UAE.WAO.012/2563  
Capacity: 220 g  
Resolution: 0.00001 g / 0.0001 g

Page 2 of 4

Date of Calibration: 2 April 2024  
Environment Condition: Ambient Temperature: 24.5 ± 0.5 °C Relative Humidity: 47.5 ± 2.5 %

Place of Calibration: Laboratory, UNITED ANALYST AND ENGINEERING CONSULTANT CO., LTD.

Condition of Equipment: Good Condition

Condition of This Results of Calibration:

1. Calibration Method: NFI Method W-MA-001 In-House Method based on UKAS Lab 14 : 2019

2. Reference Standards:

Reference Standard	Model	Serial No.	Calibrated By	Certificate No.	Due Date
Standard Weight Class E2	1mg to 200g	8501567572	TCS	M23040535	8 April 2024
Instrument	Model	Serial No.	Calibrated By	Certificate No.	Due Date
Thermo-Hydro Meter	608-411	NFI.BTH.015/23	Quality Reborn	QR24-0343	9 February 2025

3. This certification is traceable to SI UNIT

4. This certificate was certified only for the instrument we calibrated.

5. This result of calibration was found accurate as shown on date and place of calibration only.

Calibration Results:

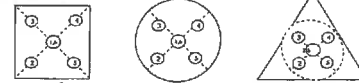
1. Repeatability of Reading:

Nominal Value (g)	Standard Deviation of Reading (g)
40	0.0000022
80	0.0000062
100	0.000048
200	0.000053

2. Off-Center Error:

A mass of 100 g was placed and moved to various position on pan.

The balance reading obtained is given in the table.



1	2	3	4	5	6	(Maximum Difference)
(g)	(g)	(g)	(g)	(g)	(g)	(g)
100.0002	100.0001	100.0002	99.9999	100.0001	100.0001	0.0003

F-CS-012 Revision: 01 Date: 20-04-65

## Calibration Report

Certificate No.: 2402283-001-01  
Equipment: Electronic Balance  
Manufacturer: METTLER TOLEDO  
Model: XSR205DU  
Serial No.: C009071872  
ID No.: UAE.WAO.012/2563  
Capacity: 220 g  
Resolution: 0.00001 g / 0.0001 g

Date of Calibration: 2 April 2024

Page 3 of 4

Calibration Results: (Continued)

Calibration Range: 0 - 50 g

Calibration Adjustment: Internal Calibration

3. Departure from Nominal Value: (Range: 0 - 80 g; Resolution: 0.00001 g)

Nominal Value	Standard Value	Average Reading	Correction	Uncertainty	Coverage Factor
(g)	(g)	(g)	(g)	(g)	k
Unload	0.000000	0.00000	0.00000	0.0000088	2.00
0.001	0.001003	0.00101	-0.00001	0.0000091	2.00
0.005	0.005003	0.00499	0.00001	0.0000094	2.00
0.01	0.010003	0.01000	0.00000	0.0000091	2.00
0.05	0.049995	0.05000	0.00000	0.0000098	2.00
0.1	0.100011	0.10000	0.00001	0.000011	2.00
0.5	0.500016	0.50001	0.00001	0.000014	2.00
1	1.000023	1.00002	-0.00002	0.000016	2.00
2	2.000023	2.00001	0.00001	0.000017	2.00
5	5.000017	5.00002	0.00000	0.000020	2.00
10	10.000009	10.00000	0.00001	0.000026	2.00
20	20.000031	20.00002	0.00001	0.000037	2.00
30	30.000040	30.00003	0.00001	0.000052	2.00
50	50.000028	50.00004	-0.00001	0.000068	2.00
80	80.000068	80.00005	0.00002	0.00011	2.00

F-CS-012 Revision: 01 Date: 20-04-65

## Calibration Report

Certificate No.: 2402283-001-01  
Equipment: Electronic Balance  
Manufacturer: METTLER TOLEDO  
Model: XSR205DU  
Serial No.: C009071872  
ID No.: UAE.WAO.012/2563  
Capacity: 220 g  
Resolution: 0.00001 g / 0.0001 g

Page 4 of 4

Date of Calibration: 2 April 2024

Calibration Results: (Continued)

Calibration Range: 81 - 200 g

Calibration Adjustment: Internal Calibration

3. Departure from Nominal Value: (Range: 81 - 200 g; Resolution: 0.00001 g)

Nominal Value	Standard Value	Average Reading	Correction	Uncertainty	Coverage Factor
(g)	(g)	(g)	(g)	(g)	k
90	90.000010	90.00000	0.00001	0.000015	2.00
100	100.000006	100.00000	0.00001	0.000015	2.00
110	110.000007	110.00001	0.00000	0.000017	2.00
120	120.000009	120.00000	0.00001	0.000018	2.00
130	130.000010	130.00000	0.00001	0.000019	2.00
140	140.000014	140.00000	0.00001	0.000020	2.00
150	150.000009	150.00001	0.00000	0.000020	2.00
160	160.000010	160.00001	0.00000	0.000022	2.00
170	170.000012	170.00001	0.00000	0.000023	2.00
200	200.000016	200.00002	0.00002	0.000028	2.00

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 %.

----- End -----

F-CS-012 Revision: 01 Date: 20-04-65



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



Cert.No.: 23CH934  
Page.: 1 of 3

## Certificate of Calibration

Equipment : pH Meter  
Manufacturer : Ecosence  
Model : pH110A  
Serial No. : JC02743  
ID No. : UAE.EFM.195/2561 (ENV.pH.05/61)  
Condition As-Received : Used Item  
Received Date : 25 July 2023  
Calibration Date : 25 July 2023  
Reference : 2307-0790WSC-2  
Submitted by : United Analyst and Engineering Consultant Co., Ltd.  
3 Soi Udomsuk 41, Sukhumvit Road, Bangkok,  
Phraekhanong, Bangkok 10260

Ambient Temperature : (25 ± 2.5) °C  
Relative Humidity : (50 ± 15) %  
Calibration Procedure : In-house method :  
- CP-CH5 by direct measurement with standard  
voltage calibrator and direct measurement with  
certified reference material (CRM)  
- CP-CH5 by comparison with standard thermometer

Calibrated by : Warakorn Lemgagatrakul

Approved by :   
Approved Signatory

( ) Malee Butiruea  
(✓) Saithip Meangmal  
( ) Warakorn Lemgagatrakul

Issue Date : 27 July 2023

The Uncertainties are for a confidence probability of approximately 95%

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

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Cert.No.: 23CH934  
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	22E2769	24 Aug 2023
2) Ref. Standard Thermometer	A54359	80RC020	22I1251	11 Oct 2023

This certification is traceable to the International System of Unit maintained through:-  
- Technology Promotion Association (Thailand-Japan)

2. Certified Reference Materials : 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 4.008	CPA chem	863832	28 Dec 2024
pH 6.886	CPA chem	863833	28 Dec 2023
pH 10.010	CPA chem	863835	28 Dec 2023

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 Fluke at pH (4.7)(7,10)

Unit Under Calibration	Nominal Value	Standard Voltage Input	Actual Reading		Uncertainty of Measurement (±mV)	Coverage factor k
			mV	pH		
pH Meter S/N: JC02743	4.00	177.48	177	4.01	0.58	2.00
	7.00	0.00	0	7.00	0.58	2.00
	7.00	0.00	0	7.00	0.58	2.00
	10.00	-177.48	-177	10.01	0.58	2.00

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Cert.No.: 23CH934  
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 (±)	Coverage factor k
pH Electrode S/N: 2904028IA605377	4.008	4.01	121	0.0071	2.00
	6.886	6.98	-50	0.0099	2.00
	6.986	7.00	-51	0.0099	2.00
	10.010	10.01	-228	0.0095	2.00

### Function : Temperature Measurement

(\*) Without adjustment

This equipment was connected with Temperature Probe;

- Model :  
- Serial No. : 2004028IA605377  
Dimension of probe:  
- Length : 120 mm  
- Diameter : 12 mm  
- Immersion Depth : 100 mm

Calibration Point (°C)	Standard Temperature (°C)	UUC* Reading (°C)	Error (°C)	Uncertainty of measurement (± °C)	Coverage factor k
25.0	25.002	25.0	-0.002	0.13	2.00
30.0	30.008	30.0	-0.008	0.13	2.00
35.0	35.009	35.0	0.000	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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TECHNOLOGY PROMOTION ASSOCIATION (THAILAND-JAPAN)  
CORPORATE SERVICES 3: EQUIPMENT CALIBRATION AND TESTING SERVICES  
534/4 PATTANAKARN ROAD SOI 18, SUANLIANG, SUANLIANG BANGKOK 10250  
TEL: 0-2717-3000-29 FAX: 0-2719-9484



## Certificate of Calibration

Cert.No.: 24MM282  
Page.: 1 of 3

Equipment : Electronic Balance  
Manufacturer : Mettler Toledo  
Model : AB204-S/FACT  
Serial No. : 1128361010  
ID No. : UAE.WAS.002/2552  
Submitted by : United Analyst and Engineering Consultant Co., Ltd.  
3 Soi Udomsuk 41, Sukhumvit Road,  
Bangchak, Phraekhanong,  
Bangkok 10260

Location : Balance Room (108)

Received order : 11 May 2024  
Calibration Date : 11 May 2024  
Ambient Temperature : 15 °C to 40 °C  
Relative Humidity : 30 % to 90 %

Calibrated by : Khiti Rutanaprapachal

Approved by :   
Approved Signatory

( ) Ponpan Palpin  
( ) Suwit Imjel  
(✓) Kunchit Promprad

Issue Date : 15 May 2024

The Uncertainties are for a confidence probability of approximately 95%

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

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Equipment : Electronic Balance  
Condition As-Received : Used Item  
Reference : 2405-0166OC-1  
Procedure used :-

Cert.No.: 24MM262  
Page: 2 of 3

Calibration were conducted using in-house calibration procedure CP-0B01 based on UKAS LAB 14 according to direct measurement method against standard weight.

#### Condition of this result of calibration

##### 1. Reference standard Instruments:-

Instruments	Model	Serial No.	ID No.	Test report No.	Due date
1) Standard Weight Set (E2)	15884	24053	7QR007	NM-0013-24	25 Jan 2026

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

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

4. This certificate is not certified for any commercial transaction.

5. This certificate is traceable to the International System of Unit.

Result of calibration ( ) Without Adjustment ( \* ) After Adjustment by Internal Calibration

Range capacity : 0 g to 220 g Resolution 0.0001 g

##### Before Adjustment :

Applied Weight	Balance Reading	Correction	Measurement Uncertainty	Coverage Factor
(g)	(g)	(g)	(± mg)	(k)
100	100.0000	0.0000	0.19	2.03
200	200.0006	-0.0006	0.30	2

##### After Adjustment :

#### 1. Determination of the standard deviation of weighing machine (n = 10)

Applied Weight	Standard Deviation of Reading (g)
(g)	
100	0.00007
200	0.00005

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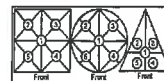
Equipment : Electronic Balance  
Condition As-Received : Used Item  
Reference : 2405-0166OC-1

Cert.No.: 24MM262  
Page: 3 of 3

#### Result of calibration

##### 2. Effect of off center loading

A mass of 100 g was placed to various position on the pan.  
The weighing machine reading error obtained is given in the table



Maximum difference between off-center and central loading (g)  
0.0001

Position 1 (g)	Position 2 (g)	Position 3 (g)	Position 4 (g)	Position 5 (g)
-0.0004	-0.0004	-0.0003	-0.0003	-0.0004

##### 3. Departure from nominal value

Applied Weight (g)	Balance Reading (g)	Correction (g)	Measurement Uncertainty (± mg)	Coverage Factor (k)
Unload	0.0000	0.0000	0.15	2.13
0.01	0.0100	0.0000	0.15	2.13
0.05	0.0500	0.0000	0.15	2.13
0.1	0.1000	0.0000	0.15	2.13
0.5	0.5000	0.0000	0.15	2.13
1	1.0000	0.0000	0.15	2.13
10	10.0000	0.0000	0.15	2.11
50	49.9999	+0.0001	0.17	2.06
100	99.9999	+0.0001	0.19	2.03
150	149.9998	+0.0002	0.29	2
200	199.9990	+0.0010	0.30	2

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

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TECHNOLOGY PROMOTION ASSOCIATION (THAILAND-JAPAN)  
CORPORATE SERVICES 3: EQUIPMENT CALIBRATION AND TESTING SERVICES  
334/4 PATTANAKARN ROAD SOI 16, SUANLUANG, SUANLUANG BANGKOK 10250  
TEL: 0-2717-3000-29 FAX: 0-2719-9484



Cert. No.: 24TM588  
Page : 1 of 3

## Certificate of Calibration

Equipment : Hot Air Oven  
Manufacturer : Memmert  
Model : UF 55  
Serial No. : B212.0411  
ID No. : UAE.WAO.005/2556  
Submitted by : United Analyst and Engineering Consultant Co.,Ltd.  
3 Sol Udomsuk 41, Sukhumvit Road,  
Bangchak, Phrakhanong,  
Bangkok 10260  
Location : Lab Floor 2  
Received Order : 01 April 2024  
Calibration Date : 01 - 02 April 2024  
Ambient Temperature : (26 ± 10) °C  
Relative Humidity : (50 ± 30) %  
Calibrated by : Krisda Maloo

Approved by :  
( ) Ponpan Palpin  
(✓) Suwit Imjai  
( ) Kunchit Promprat

Issue Date : 5 April 2024

The Uncertainties are for a confidence probability of approximately 95%

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

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A 0065065



Equipment : Hot Air Oven  
Condition As-Received : Used Item  
Reference : 2404-0004OC-3  
Procedure Used :-

Cert. No.: 24TM588  
Page : 2 of 3

Calibration were conducted using calibration procedure CP-OT02 based on TLAS G-20 according to direct measurement method with Data Acquisition which connected with Resistance Temperature Detector (RTD) and Thermocouple Type T.

The temperature scale used was based on ITS-90.

#### Condition of this result of calibration

##### 1. Reference standard instrument:-

Instrument	Serial No.	Cert. No.	Traceable	Due Date
1) Data Acquisition	MY57013711	23LM115	TPA	11 Jul 2024

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

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

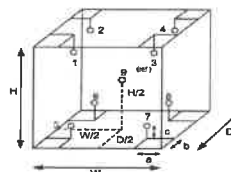
Remark : TPA : Technology Promotion Association (Thailand - Japan)

Result of Calibration :- ( ) Without Adjustment

Function of UUC\* : Temperature Source

Fresh air setting : Close

Environment during calibration		
	Beginning	Finished
Temp. (°C)	27	26
REL.Humid. (%)	47	48
AC Supply (volt)	221	220



Probe Installation Details : Dimension of Chamber :  
a = 5.0 cm D = 0.50 m  
b = 5.0 cm W = 0.80 m  
c = 5.0 cm H = 0.75 m  
Capacity = 0.30 m³

Ref. Std. ID No.: @ Calibration Point		
Position :	(120 to 180) °C	(104) °C
1	21-18TC-01	22-18RTD-2/1
2	21-18TC-02	18RTD-2/2
3	21-18TC-03	18RTD-2/3
4	21-18TC-04	18RTD-2/4
5	21-18TC-05	18RTD-2/5
6	21-18TC-06	18RTD-2/6
7	21-18TC-07	18RTD-2/7
8	21-18TC-08	18RTD-2/8
9 (ref.)	21-18TC-09	18RTD-2/9

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a 1209739







Cert.No.: 24TW39  
Page.: 1 of 2

## Certificate of Testing

Equipment : DO Meter  
Manufacturer : YSI  
Model : 5100  
Serial No. : 11B 101863  
ID No. : UAE.WAO.004/2554  
Received Date : 20 February 2024  
Test Date : 21 February 2024  
Reference : 2402-0629DSC-1  
Submitted by : United Analyst and Engineering Consultant Co.,Ltd.  
3 Soi Udomsuk 41, Sukhumvit Road, Bangchak,  
Phrakhanong, Bangkok 10260  
Laboratory Condition : Temperature ( 25 ± 5 ) °C  
Humidity ( 50 ± 20 ) %  
Test Procedure : In - house method : CPA-CH9  
by Comparison Technique with Azide Modification Method  
Tested by : Walailak Srithean  
Approved by :   
( ) Ponthipha Tameyakul  
( ) Unnopphol Harachai  
(✓) Sathip Meangmai  
Issue Date : 22 February 2024

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Cert.No.: 24TW39  
Page.: 2 of 2

### Condition of this result of calibration

1. Reference Standard Instruments :  
This certification is traceable to the International System of Unit through the reference standards laboratory of Industrial Calibration Center, Technology Promotion Association (Thailand-Japan).

Instruments	Serial No.	ID No.	Certificate No.	Due Date
1. Burette	-	130BU10	23CG1172	22 Mar 2025
2. Balance	14233821	110RC001	23MM405	16 July 2024

### 2. Standard Material :-

Material	Manufacturer	Lot.No.	Assay
Sodium Thiosulfate pentahydrate	Merck	AM1763316	100.2%

Result : Dissolved Oxygen Meter Adjustment With Air 100 %  
Dissolved Oxygen Probe No.: 228100125

Titration Method (Azide Modification Method) (mg/L)	DO Meter Reading (mg/L)	Standard Deviation (mg/L)
8.20	8.19	0.0055

This report was certified only for the instrument we tested. It is allowable to use for study  
intend to use for advertising and referral purpose is prohibited. This report may not be reproduced  
other in full without written approval of the laboratory

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ศูนย์พัฒนาและฝึกอบรมด้านอาหาร  
กรมส่งเสริมการค้าระหว่างประเทศ  
Foundation for Industrial Development National Food Institute  
Food Industrial Laboratory Service Center



## Calibration Certificate

Certificate No.: 2402283-001-01  
Client name: UNITED ANALYST AND ENGINEERING CONSULTANT CO., LTD.  
Address: 3 Soi Udomsuk 41, Sukhumvit Road,  
Bangchack, Phrakhanong, Bangkok 10260

Page 1 of 4

Equipment: Electronic Balance  
Manufacturer: METTLER TOLEDO  
Model: XSR205DU  
Serial No.: C009071872  
ID No.: UAE.WAO.012/2563  
Order No.: 2402283  
Operation No.: 2402283-001  
Date of Receipt: 2 April 2024  
Date of Calibration: 2 April 2024  
Calibrated by Mr. Jerawut Propawuttipong  
Scientist  
Date of Issue: 9 April 2024

Approved by   
( Mr. )  
Manager, Division of Calibration Laboratory  
Responsible for the Technical Management Team

The uncertainties are for a confidence probability of approximately 95%

This Certificate is issued in accordance with the conditions of accreditation granted by the Thai Laboratory Accreditation Scheme which has assessed the measurement capability of the laboratory and its traceability to recognized national standards and to the units of measurement realized at the corresponding national standards laboratory. This certificate may not be reproduced other than in full except with the prior written approval of the National Food Institute.

F-CS-009 Revision: 01 Date: 20-04-65



ศูนย์พัฒนาและฝึกอบรมด้านอาหาร  
กรมส่งเสริมการค้าระหว่างประเทศ  
Foundation for Industrial Development National Food Institute  
Food Industrial Laboratory Service Center



## Calibration Report

Certificate No.: 2402283-001-01  
Equipment: Electronic Balance  
Manufacturer: METTLER TOLEDO  
Model: XSR205DU  
Serial No.: C009071872  
Capacity: 220 g  
Resolution: 0.0001 g / 0.0001 g  
ID No.: UAE.WAO.012/2563

Page 2 of 4

Date of Calibration: 2 April 2024  
Environment Condition: Ambient Temperature: 34.5 ± 0.5 °C Relative Humidity: 47.5 ± 2.5 %  
Place of Calibration: Laboratory, UNITED ANALYST AND ENGINEERING CONSULTANT CO., LTD.

Condition of Equipment: Good Condition

### Condition of This Result of Calibration:

1. Calibration Method: NFI Method W-MA-001 In-House Method based on UKAS Lab 14 : 2019  
2. Reference Standards:

Reference Standard	Model	Serial No.	Calibrated By	Certificate No.	Due Date
Standard Weight Class E2	1 mg to 200g	B555567572	TCS	M23040535	8 April 2024
Instrument	Model	Serial No.	Calibrated By	Certificate No.	Due Date
Thermo-Hygro Meter	608-H1	NFLBTH 016/23	Quality Reborn	QR24-0343	9 February 2025

3. This certification is traceable to SI UNIT  
4. This certificate was certified only for the instrument we calibrated.  
5. This result of calibration was found accurate as shown on date and place of calibration only.

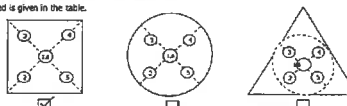
### Calibration Results:

#### 1. Repeatability of Reading:

Nominal Value ( g )	Standard Deviation of Reading ( g )
40	0.000052
80	0.000063
100	0.000048
200	0.000053

#### 2. Off-Center Error:

A mass of 100 g was placed and moved to various position on pan.  
The balance reading obtained is given in the table.



1	2	3	4	5	6	(Maximum Difference)
( g )	( g )	( g )	( g )	( g )	( g )	( g )
100.0002	100.0001	100.0002	99.9999	100.0001	100.0003	0.0001

F-CS-012 Revision: 01 Date: 20-04-65





มูลนิธิส่งเสริมพัฒนาอุตสาหกรรม  
ศูนย์บริการทดสอบปฏิบัติการอุตสาหกรรม  
Foundation for Industrial Development National Food Institute  
Food Industrial Laboratory Service Center



## Calibration Report

Certificate No.: 2402283-001-01

Equipment: Electronic Balance Manufacturer: METTLER TOLEDO  
Model: XSR205DU Resolution: 0.0001 g / 0.0001 g  
Serial No.: C005071972 ID No.: UAE.WAQ.012/2563  
Capacity: 220 g

Date of Calibration: 2 April 2024

Page 3 of 4

Calibration Results: (Continued)

Calibration Range: 0 - 80 g

Calibration Adjustment: Internal Calibration

3. Departure from Nominal Value: (Range: 0 - 80 g; Resolution: 0.00001 g)

Nominal Value	Standard Value	Average Reading	Correction	Uncertainty	Coverage Factor
(g)	(g)	(g)	(g)	(g)	k
Unload	0.00000	0.00000	0.00000	0.0000288	2.00
0.001	0.001003	0.00101	-0.00001	0.0000091	2.00
0.005	0.005003	0.00499	0.00001	0.0000094	2.00
0.01	0.010003	0.01000	0.00000	0.0000091	2.00
0.05	0.049996	0.05000	0.00000	0.0000098	2.00
0.1	0.100011	0.10000	0.00001	0.000011	2.00
0.5	0.500016	0.50001	0.00001	0.000014	2.00
1	1.000033	1.00002	-0.00002	0.000016	2.00
2	2.000023	2.00001	0.00001	0.000017	2.00
5	5.000017	5.00002	0.00000	0.000030	2.00
10	10.000029	10.00000	0.00001	0.000026	2.00
20	20.000031	20.00002	0.00001	0.000037	2.00
30	30.000016	30.00003	0.00001	0.000052	2.00
50	50.000018	50.00004	-0.00001	0.000068	2.00
80	80.000068	80.00005	0.00002	0.00011	2.00

FCS-012 Revision: 01 Date: 20-04-65



มูลนิธิส่งเสริมพัฒนาอุตสาหกรรม  
ศูนย์บริการทดสอบปฏิบัติการอุตสาหกรรม  
Foundation for Industrial Development National Food Institute  
Food Industrial Laboratory Service Center



## Calibration Report

Certificate No.: 2402283-001-01

Equipment: Electronic Balance Manufacturer: METTLER TOLEDO  
Model: XSR205DU Resolution: 0.0001 g / 0.0001 g  
Serial No.: C005071972 ID No.: UAE.WAQ.012/2563  
Capacity: 220 g

Date of Calibration: 2 April 2024

Page 4 of 4

Calibration Results: (Continued)

Calibration Range: 81 - 200 g

Calibration Adjustment: Internal Calibration

3. Departure from Nominal Value: (Range: 81 - 200 g; Resolution: 0.0001 g)

Nominal Value	Standard Value	Average Reading	Correction	Uncertainty	Coverage Factor
(g)	(g)	(g)	(g)	(g)	k
90	90.00010	90.00000	0.00010	0.00015	2.00
100	100.00006	100.00000	0.00006	0.00015	2.00
110	110.00007	110.00001	0.00006	0.00017	2.00
120	120.00009	120.00000	0.00009	0.00018	2.00
130	130.00010	130.00000	0.00010	0.00019	2.00
140	140.00014	140.00000	0.00014	0.00020	2.00
150	150.00009	150.00001	0.00008	0.00020	2.00
160	160.00010	160.00001	0.00009	0.00022	2.00
170	170.00012	170.00001	0.00011	0.00023	2.00
200	200.00016	200.00000	0.00016	0.00028	2.00

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 %.

FCS-012 Revision: 01 Date: 20-04-65



TECHNOLOGY PROMOTION ASSOCIATION (THAILAND-JAPAN)  
CORPORATE SERVICES 3: EQUIPMENT CALIBRATION AND TESTING SERVICES  
3844 PATTANAJARN ROAD SOI 18, SUANLUANG, SUANLUANG BANGKOK 10250  
TEL: 0-2717-3000-29 FAX: 0-2719-9484



## Certificate of Calibration

Equipment: pH Meter  
Manufacturer: Horiba  
Model: LAQUA-PH210  
Serial No.: HA9M0046  
ID No.: UAE.EFM.001/2563(EFM.pH.01/83)  
Condition As-Received: Used Item  
Received Date: 09 January 2024  
Calibration Date: 10 January 2024  
Reference: 2401-0219WVC-3  
Submitted by: United Analyst and Engineering Consultant Co., Ltd.  
3 Soi Udomsak 41, Sathumvit Road,  
Bangchak, Phraekhonong, Bangkok 10260  
Ambient Temperature: (25 ± 2.6) °C  
Relative Humidity: (50 ± 15) %  
Calibration Procedure: In-house method:  
- CP-CHS by direct measurement with standard voltage calibrator and direct measurement with certified reference material (CRM)  
- CP-CHS by comparison with standard thermometer

Calibrated by: Warakorn Lemgagrakul

Approved by:   
Approved Signatory

(✓) Sathip Meengmal  
( ) Warakorn Lemgagrakul  
( ) Porpen Palpim

Issue Date: 15 January 2024

The Uncertainties are for a confidence probability of approximately 95 %

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

A 0062456



Cert.No.: 24CH40  
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	23E2802	27 Aug 2024
2) Ref. Standard Thermometer	4862054	110RC044	23B906	28 July 2024

This certification is traceable to the International System of Unit maintained through:-  
- Technology Promotion Association (Thailand-Japan)

2. Certified Reference Materials : 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 4.008	CPA chem	840102	27 Nov 2025
pH 6.985	CPA chem	931959	01 Oct 2024
pH 9.997	CPA chem	840105	02 Nov 2024

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 Fluke at pH (4.7)(7.10)

Unit Under Calibration	Nominal Value	Standard Voltage Input	Actual Reading		Uncertainty of Measurement (mV)	Coverage factor k
			mV	pH		
pH Meter S/N: HA9M0046	4.00	177.48	177.5	4.01	0.056	2.00
	7.00	0.00	0.2	7.00	0.058	2.00
	7.00	0.00	0.2	7.00	0.058	2.00
	10.00	-177.48	-177.0	10.01	0.058	2.00

Sathip

a 1197725



Cert.No.: 24CH40  
Page: 3 of 3

#### Calibration Results

##### Function : pH Measurement

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

Unit Under Calibration	Standard pH Buffer Solution	Actual pH Reading	Actual mV Reading (mV)	Uncertainty of pH measurement ( $\pm$ )	Coverage factor $k$
pH Electrode S/N.: -	4.006	4.01	171.9	0.0079	2.00
	6.986	6.99	-2.2	0.0093	2.00
	6.986	6.99	-3.6	0.0093	2.00
	9.987	10.01	-171.0	0.011	2.07

##### Function : Temperature Measurement

(\*) Without adjustment

This equipment was connected with Temperature Probe;

- Model : -

- Serial No. : -

Dimension of probe:

- Length : 103 mm

- Diameter : 16 mm

- Immersion Depth : 90 mm

Calibration Point (°C)	Standard Temperature (°C)	UUC* Reading (°C)	Error (°C)	Uncertainty of measurement ( $\pm$ °C)	Coverage factor $k$
25.0	25.002	25.0	-0.002	0.13	2.00
30.0	30.002	30.0	-0.002	0.13	2.00
35.0	35.003	35.0	-0.003	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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Signature

a 1197724



TECHNOLOGY PROMOTION ASSOCIATION (THAILAND-JAPAN)  
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534/4 PATTANAKARN ROAD SOI 18, SUANLUANG, SUANLUANG BANGKOK 10250  
TEL.0-2717-3000-29 FAX.0-2719-9484



## Certificate of Calibration

Cert.No.: 24MM292  
Page: 1 of 3

Equipment : Electronic Balance  
Manufacturer : Mettler Toledo  
Model : AB204-S/FACT  
Serial No. : 1129361010  
ID No. : UAE.WAS.002/2552  
Submitted by : United Analyst and Engineering Consultant Co.,Ltd.  
3 Soi Udomsuk 41, Sukhumvit Road,  
Bangchak, Phrakhanong,  
Bangkok 10260  
Location : Balance Room (106)  
Received order : 11 May 2024  
Calibration Date : 11 May 2024  
Ambient Temperature : 15 °C to 40 °C  
Relative Humidity : 30 % to 90 %  
Calibrated by : Khit Rutanaprapachal  
Approved by : Kunchit  
Approved Signatory  
( ) Ponpan Palpin  
( ) Suwit Injai  
(✓) Kunchit Promrat

Issue Date : 15 May 2024

The Uncertainties are for a confidence probability of approximately 95%

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Equipment : Electronic Balance  
Condition As-Received : Used Item  
Reference : 2405-0166OC-1

Cert.No.: 24MM292  
Page: 2 of 3

Procedure used :-

Calibration were conducted using in-house calibration procedure CP-0801 based on UKAS LAB 14 according to direct measurement method against standard weight.

#### Condition of this result of calibration

1. Reference standard Instruments:-

Instruments	Model	Serial No.	ID No.	Test report No.	Due date
1) Standard Weight Set (E2)	15884	24053	70RC007	MM-0013-24	25 Jan 2026

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

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

4. This certificate is not certified for any commercial transaction.

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

Result of calibration ( ) Without Adjustment ( \* ) After Adjustment by Internal Calibration

Range capacity : 0 g to 220 g Resolution 0.0001 g

Before Adjustment :

Applied Weight (g)	Balance Reading (g)	Correction (g)	Measurement Uncertainty ( $\pm$ mg)	Coverage Factor ( $k$ )
100	100.0000	0.0000	0.19	2.03
200	200.0006	-0.0006	0.30	2

After Adjustment :

1. Determination of the standard deviation of weighing machine (  $n = 10$  )

Applied Weight (g)	Standard Deviation of Reading (g)
100	0.00007
200	0.00005



Equipment : Electronic Balance  
Condition As-Received : Used Item  
Reference : 2405-0166OC-1

Cert.No.: 24MM292  
Page: 3 of 3

#### Result of calibration

##### 2. Effect of off center loading

A mass of 100 g was placed to various position on the pan.  
The weighing machine reading error obtained is given in the table

Position 1 (g)	Position 2 (g)	Position 3 (g)	Position 4 (g)	Position 5 (g)	Maximum difference between off-center and central loading (g)
-0.0004	-0.0004	-0.0003	-0.0003	-0.0004	0.0001

##### 3. Departure from nominal value

Applied Weight (g)	Balance Reading (g)	Correction (g)	Measurement Uncertainty ( $\pm$ mg)	Coverage Factor ( $k$ )
Unload	0.0000	0.0000	0.15	2.13
0.01	0.0100	0.0000	0.15	2.13
0.05	0.0500	0.0000	0.15	2.13
0.1	0.1000	0.0000	0.15	2.13
0.5	0.5000	0.0000	0.15	2.13
1	1.0000	0.0000	0.15	2.13
10	10.0000	0.0000	0.15	2.11
50	49.9999	+0.0001	0.17	2.06
100	99.9998	+0.0001	0.19	2.03
150	149.9998	+0.0002	0.29	2
200	199.9990	+0.0010	0.30	2

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

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TECHNOLOGY PROMOTION ASSOCIATION (THAILAND-JAPAN)  
CORPORATE SERVICES : EQUIPMENT CALIBRATION AND TESTING SERVICES  
534/4 PATTANAKARN ROAD SOI 18, SUANLUANG, SUANLUANG BANGKOK 10250  
TEL. 0-2717-3000-79 FAX. 0-2719-9484



Cert. No.: 24TM303  
Page : 1 of 3

## Certificate of Calibration

Equipment : BOD Incubator  
Manufacturer : Aroo  
Model : UC4-1320  
Serial No. : 19URC49013201  
ID No. : UAE.WAO.0152561  
Submitted by : United Analyst and Engineering Consultant Co.,Ltd.  
3 Soi Udomsuk 41, Sukhumvit Road,  
Bangchak, Phrakhanong,  
Bangkok 10260  
Location : Lab Floor 2  
Received Order : 10 February 2024  
Calibration Date : 10 February 2024  
Ambient Temperature : ( 28 ± 10 ) °C  
Relative Humidity : ( 50 ± 30 ) %  
Calibrated by : Tawatchai Pama  
Approved by :   
( ) Ponthippa Tameyakul  
(✓) Unnopphol Harachai  
( ) Suwit Imjai

Issue Date : 19 February 2024

The Uncertainties are for a confidence probability of approximately 95 %

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



Equipment : BOD Incubator  
Condition As-Received : Used Item  
Reference : 2402-0234OC-1  
Result of Calibration : ( \* ) Without Adjustment  
Function of UUC\* : Temperature Source  
Fresh air setting : Not Available

Cert. No.: 24TM303  
Page : 3 of 3

Calibration Point (°C)	UUC* Setting (°C)	UUC* Reading (°C)	Temperature stability (± °C)	Temperature uniformity (°C)	Overall Variation (°C)	Coverage Factor k
20.0	20.1	19.9	0.37	0.72	1.4	2

Calibration Point (°C)	Measured Temperature (°C)									Uncertainty (± °C)
	1	2	3	4	5	6	7	8	9 (ref.)	
20.0	19.873	19.803	20.322	19.690	19.615	19.585	19.612	19.558	19.645	0.58

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

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

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

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

UUC\* : Unit Under Calibration

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

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

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Equipment : BOD Incubator  
Condition As-Received : Used Item  
Reference : 2402-0234OC-1  
Procedure Used :-

Cert. No.: 24TM303  
Page : 2 of 3

Calibration were conducted using calibration procedure CP-OT02 based on TLAS G-20 according to direct measurement method with Data Acquisition which connected with Resistance Temperature Detector ( RTD ).  
The temperature scale used was based on ITS-90.

### Condition of this result of calibration

- Reference standard instrument:-

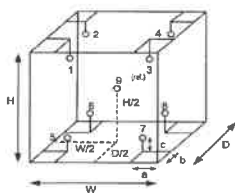
Instrument	Serial No.	Cert. No.	Traceable	Due Date
1) Data Acquisition	MY59003411	23LM208	TPA	27 Dec 2024
- This certificate is valid only to the item calibrated on date and place of calibration.
- This certification is traceable to the International System of Unit.

Remark : TPA : Technology Promotion Association ( Thailand - Japan )

Result of Calibration : ( \* ) Without Adjustment

Function of UUC\* : Temperature Source

Fresh air setting : Not Available



Probe Installation Details :  
a = 10 cm  
b = 10 cm  
c = 10 cm  
Dimension of Chamber :  
D = 0.82 m  
W = 1.2 m  
H = 1.2 m  
Capacity = 0.89 m³

Environment during calibration		
	Beginning	Finished
Temp. ( °C )	28	31
REL.Humid. ( % )	70	65
AC Supply ( Volt )	233	234

Position :	Ref. Std. ID No.:
1	20RTD-2/1
2	20RTD-2/2
3	20RTD-2/3
4	20RTD-2/4
5	20RTD-2/5
6	20RTD-2/6
7	20RTD-2/7
8	20RTD-2/8
9 (ref.)	20RTD-2/9



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TEL. 0-2717-3000 FAX. 0-2719-9484

Cert.No.: 24TW39  
Page: 1 of 2

## Certificate of Testing

Equipment : DO Meter  
Manufacturer : YSI  
Model : 5100  
Serial No. : 11B 101853  
ID No. : UAE.WAO.0042554  
Received Date : 20 February 2024  
Test Date : 21 February 2024  
Reference : 2402-0629DSC-1  
Submitted by : United Analyst and Engineering Consultant Co.,Ltd.  
3 Soi Udomsuk 41, Sukhumvit Road, Bangchak,  
Phrakhanong, Bangkok 10260  
Laboratory Condition : Temperature ( 25 ± 5 ) °C  
Humidity ( 50 ± 20 ) %  
Test Procedure : In - house method : CP-CH8  
by Comparison Technique with Azide Modification Method

Tested by : Watsak Sirithan

Approved by :   
Approved Signatory

( ) Ponthippa Tameyakul  
( ) Unnopphol Harachai  
(✓) Sathip Meangmal

Issue Date : 22 February 2024

เอกสารไม่ควบคุม





## Calibration Report

Certificate No.: 2402283-001-01  
Equipment: Electronic Balance  
Model: XSR205DU  
Serial No.: C009071872  
Capacity: 220 g  
Manufacturer: METTLER TOLEDO  
Resolution: 0.00001 g / 0.0001 g  
ID No.: UAE.WAO.012/2563

Date of Calibration: 2 April 2024 Page 2 of 4

Environment Condition: Ambient Temperature: 24.5 ± 0.5 °C Relative Humidity: 47.5 ± 2.5 %

Place of Calibration: Laboratory, UNITED ANALYST AND ENGINEERING CONSULTANT CO., LTD.

Condition of Equipment: Good Condition

Condition of This Results of Calibration:

1. Calibration Method: NFI Method W-MA-001 In-House Method based on UKAS Lab 14 : 2019

2. Reference Standards:

Reference Standard	Model	Serial No.	Calibrated By	Certificate No.	Due Date
Standard Weight Class E2	1mg to 200g	8505567372	TCS	M23040535	8 April 2024
Instrument	Model	Serial No.	Calibrated By	Certificate No.	Due Date
Thermohygro Meter	608-H1	NFI.BT1 016/23	Quality Return	Q824-0343	9 February 2025

3. This certification is traceable to SI UNIT

4. This certificate was certified only for the instrument we calibrated.

5. This result of calibration was found accurate as shown on date and place of calibration only.

Calibration Results:

1. Repeatability of Reading:

Nominal Value (g)	Standard Deviation of Reading (g)
40	0.000053
80	0.000063
100	0.000048
200	0.000053

2. Off-Center Error:

A mass of 100 g was placed and moved to various position on pan.

The balance reading observed is given in the table:

1	2	3	4	5	6	(Maximum Difference)
(g)	(g)	(g)	(g)	(g)	(g)	(g)
100.0002	100.0001	100.0002	99.9999	100.0001	100.0001	0.0003

FCS-012 Revision: 01 Date: 20-04-65

## Calibration Report

Certificate No.: 2402283-001-01  
Equipment: Electronic Balance  
Model: XSR205DU  
Serial No.: C009071872  
Capacity: 220 g  
Manufacturer: METTLER TOLEDO  
Resolution: 0.00001 g / 0.0001 g  
ID No.: UAE.WAO.012/2563

Date of Calibration: 2 April 2024 Page 3 of 4

Calibration Results: (Continued)

Calibration Range: 0 - 80 g

Calibration Adjustment: Internal Calibration

3. Departure from Nominal Value: (Range: 0 - 80 g; Resolution: 0.00001 g)

Nominal Value	Standard Value	Average Reading	Correction	Uncertainty	Coverage Factor
(g)	(g)	(g)	(g)	(g)	
Unloaded	0.000000	0.000000	0.000000	0.0000088	2.00
0.001	0.001003	0.001001	-0.000001	0.0000091	2.00
0.005	0.005003	0.004999	0.000001	0.0000094	2.00
0.01	0.010003	0.010000	0.000000	0.0000091	2.00
0.05	0.049995	0.050000	0.000000	0.0000098	2.00
0.1	0.100011	0.100000	0.000001	0.0000111	2.00
0.5	0.500015	0.500001	0.000001	0.000014	2.00
1	1.000003	1.000002	-0.000002	0.000016	2.00
2	2.000013	2.000003	0.000001	0.000017	2.00
5	5.000017	5.000002	0.000005	0.000020	2.00
10	10.000009	10.000000	0.000001	0.000026	2.00
20	20.000031	20.000002	0.000001	0.000037	2.00
30	30.000040	30.000003	0.000001	0.000045	2.00
50	50.000028	50.000004	-0.000001	0.000058	2.00
80	80.000008	80.000001	0.000001	0.00011	2.00

FCS-012 Revision: 01 Date: 20-04-65

## Calibration Report

Certificate No.: 2402283-001-01  
Equipment: Electronic Balance  
Model: XSR205DU  
Serial No.: C009071872  
Capacity: 220 g  
Manufacturer: METTLER TOLEDO  
Resolution: 0.00001 g / 0.0001 g  
ID No.: UAE.WAO.012/2563

Date of Calibration: 2 April 2024 Page 4 of 4

Calibration Results: (Continued)

Calibration Range: 81 - 200 g

Calibration Adjustment: Internal Calibration

3. Departure from Nominal Value: (Range: 81 - 200 g; Resolution: 0.0001 g)

Nominal Value	Standard Value	Average Reading	Correction	Uncertainty	Coverage Factor
(g)	(g)	(g)	(g)	(g)	
90	90.00013	90.00000	0.00000	0.000015	2.00
100	100.00006	100.00000	0.00000	0.000015	2.00
110	110.00007	110.00001	0.00000	0.000017	2.00
120	120.00009	120.00000	0.00000	0.000018	2.00
130	130.00010	130.00000	0.00000	0.000019	2.00
140	140.00014	140.00000	0.00000	0.000020	2.00
150	150.00009	150.00001	0.00000	0.000020	2.00
160	160.00010	160.00001	0.00000	0.000022	2.00
170	170.00012	170.00001	0.00000	0.000023	2.00
200	200.00016	200.00000	0.00000	0.000028	2.00

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 %.

FCS-012 Revision: 01 Date: 20-04-65

## Certificate of Calibration

Equipment: Cooled Incubator  
Model: KB 400  
Serial No.(or ID): 2022000002479  
Manufacturer: Binder  
Condition: New  
Shelves(pc.): 5  
Certificate No.: C31231678  
Issued Date: 10 August 2023  
Job No.: WO-00002652  
Page: 1 of 3  
Ventilation Valve: None

Customer: United Analyst and Engineering Consultant Company Limited,  
3 Soi Udomsuk 41 Sukhumvit Road,  
Bangkok, Prakanong, Bangkok 10260 Thailand.


Environment Condition: Temperature: 25 °C ± 1.9 °C  
Humidity: 49 %RH ± 5.3 %RH  
Voltage: 232 VAC ± 1.2 VAC

Calibration Place: United Analyst and Engineering Consultant Company Limited. ( Control Area )  
3 Soi Udomsuk 41 Sukhumvit Road,  
Bangkok, Prakanong, Bangkok 10260 Thailand.

Calibration By: Mr. Thanakrit Rakapal  
Calibration Date: 07 August 2023  
The Method used: In house method, CAL-WF-16, base on TLAS-G20

Traceability: This certificate is traceable to the SI Units maintained by National Institute of Metrology (NIMT), Thailand through DKSH Technology Limited.  
Certificate No. C10230019

  
(Mr. Thanakrit Rakapal)  
Person in charge

  
(Mr. Udon Srichana)  
Authorized signatory

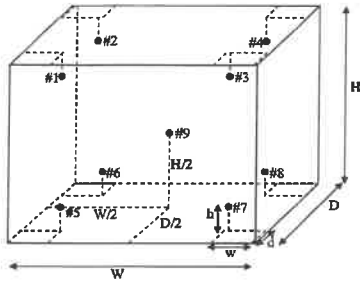
This certificate is issued the units of measurement according to the International System of Units (SI). It provides traceability of measurement to international or national standard or other recognized national standard laboratories.  
The measurement uncertainty stated in this expanded uncertainty which is obtained from the standard uncertainty multiplied by the coverage factor  $k=2$  to provide a level of confidence of approximately 95%. It is determined in accordance with the Guide to Expression of Uncertainty in Measurement (GUM).

These results may be affected by deviations from specified conditions. The results relate only to the items tested, calibrated or sampled. The report shall not be reproduced except in full without approval of DKSH Technology Limited.

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เอกสารไมเคิลคอม  
CAL-FM-C31-10: 12 Sep 2022



#### Standard Installation Locations

Volume (Calibration Zone)= 193 (Liters)

Inside chamber: W = 68 (cm) D = 49 (cm) H = 127 (cm)

Standard Locations (#1, #2, #3, #4): w = 7 (cm) d = 5 (cm) h = 15 (cm)

Standard Locations (#5, #6, #7, #8): w = 7 (cm) d = 5 (cm) h = 15 (cm)

#9: Geometric center of the chamber

Position of Std	#1	#2	#3	#4	#5	#6	#7	#8	#9
Channel of Logger	301	302	303	304	305	306	307	308	309

#### Definitions

**Indicating Temperature:** The average reading of indicating device which forms the integral part of the enclosure.

**Measured Temperature:** The average reading of standards at any positions or location.

**Measured Uniformity:** The maximum difference of measured temperatures between of any probes and the measured temperature at the reference location which are observed at same time or at close observation time as possible to determine the temperature pattern or homogeneity with the chamber at steady-state. The reference probe is preferably located in the geometric center of the chamber.

**Measured Stability:** The one-half of greatest maximum difference of measured temperatures at any one probe.

**Overall Variation:** The difference of maximum and minimum measured temperatures throughout observation time.

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CAL-FM-C31-10: 12 Sep 2022

#### Calibration Results: Without adjustment

Measurement Temperature at Spread Locations, Indicating of Unit Under Calibration: 35.0 °C

Locations	Measured Temperature (°C)	Correction of UUC (°C)	Uncertainty (± °C)
#1	35.11	0.11	0.23
#2	35.04	0.04	0.23
#3	35.03	0.03	0.23
#4	35.13	0.13	0.23
#5	35.02	0.02	0.23
#6	35.07	0.07	0.23
#7	34.97	-0.03	0.23
#8	34.97	-0.03	0.23
#9	35.10	0.10	0.23

#### Temperature Distribution

Desired (°C)	Setting (°C)	Indicating (°C)	Measured Temperature at Spread Locations (°C)									Uncertainty (± °C)*
35.0	35.0	35.0	35.11	35.04	35.03	35.13	35.02	35.07	34.97	34.97	35.10	0.23

#### Chamber Characterization

Indicating (°C)	Measured Uniformity (°C)	Measured Stability (± °C)	Overall Variation (°C)
35.0	0.16	0.04	0.22

Note: \* Maximum uncertainty of the each position

The End of Certificate

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CAL-FM-C31-10: 12 Sep 2022

#### Statements of conformity:

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

The correction of indication determined during calibration are under given measurement and environmental conditions and considering the expanded measurement uncertainty (coverage probability 95%) within the specification. The given measurement uncertainty already includes other all effects by according to the standard method, TLAS-G20. Therefore, those parameters have not been assessed separately.

#### Tolerance and Decision rules:

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

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

(Mr. Udon Srichana)  
Authorized signatory

#### Without adjustment

Desired Temperature : 35.0 °C Tolerances : 0.5 °C

Measurement Temperature at Spread Locations, Indicating of Unit Under Calibration: 35.0 °C

Locations	Measured (°C)	Correction* (°C)	Guard band (W) (± °C)	Tolerance (± °C)	Conformity
#1	35.11	0.11	0.23	0.5	Pass
#2	35.04	0.04	0.23	0.5	Pass
#3	35.03	0.03	0.23	0.5	Pass
#4	35.13	0.13	0.23	0.5	Pass
#5	35.02	0.02	0.23	0.5	Pass
#6	35.07	0.07	0.23	0.5	Pass
#7	34.97	-0.03	0.23	0.5	Pass
#8	34.97	-0.03	0.23	0.5	Pass
#9	35.10	0.10	0.23	0.5	Pass

Correction\* = Measured Temperature - Desired Temperature

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

The End of Statements of Conformity

DKSH Technology Limited  
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Phone: +66 2638 7000 Email: info@dksh.com Website: www.dksh.com/thailand

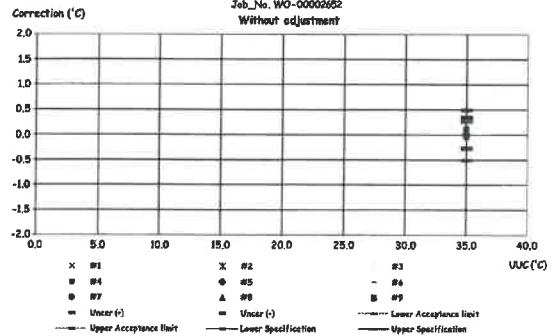
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CAL-FM-C31-10: 12 Sep 2022

#### Corr. Distribution & Max. Measurement Uncertainty

Job No. WO-00002652

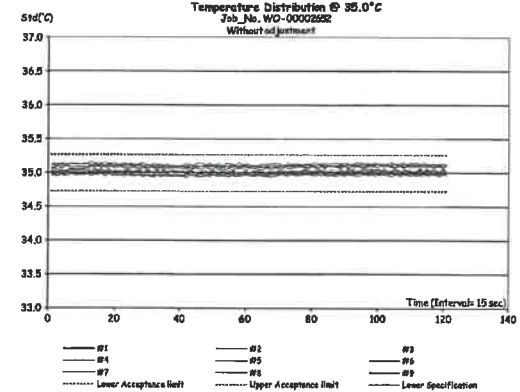
Without adjustment



#### Temperature Distribution @ 35.0 °C

Job No. WO-00002652

Without adjustment



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## ใบตรวจสอบสภาพเครื่องควบคุมอุณหภูมิ

ชนิดเครื่องมือ: Cooled Incubator

รุ่น: KB 400

เลขที่ใบงาน: WO-00002652

หมายเลขเครื่อง: 20220000022479.000

ตรวจสอบ (วัน)		รายการตรวจสอบ	ตรวจสอบ (ถึง)		หมายเหตุ
07 Aug 2023			07 Aug 2023		
ปกติ	ไม่ปกติ		ปกติ	ไม่ปกติ	
General					
<input checked="" type="checkbox"/>	<input type="checkbox"/>	1. สายไฟ	<input checked="" type="checkbox"/>	<input type="checkbox"/>	
<input checked="" type="checkbox"/>	<input type="checkbox"/>	2. การทำงาน Main Switch	<input checked="" type="checkbox"/>	<input type="checkbox"/>	
<input checked="" type="checkbox"/>	<input type="checkbox"/>	3. การทำงาน Selector Key	<input checked="" type="checkbox"/>	<input type="checkbox"/>	
<input checked="" type="checkbox"/>	<input type="checkbox"/>	4. การแสดงผล Display	<input checked="" type="checkbox"/>	<input type="checkbox"/>	
<input checked="" type="checkbox"/>	<input type="checkbox"/>	5. การทำงาน พัดลม	<input checked="" type="checkbox"/>	<input type="checkbox"/>	
<input type="checkbox"/>	<input type="checkbox"/>	6. สลัก Lever of Ventilation valve	<input type="checkbox"/>	<input type="checkbox"/>	ไม่มี
<input checked="" type="checkbox"/>	<input type="checkbox"/>	7. สลัก Lever door open / close	<input checked="" type="checkbox"/>	<input type="checkbox"/>	
<input checked="" type="checkbox"/>	<input type="checkbox"/>	8. สลัก Door seal	<input checked="" type="checkbox"/>	<input type="checkbox"/>	
<input checked="" type="checkbox"/>	<input type="checkbox"/>	9. การทำงานของระบบ Safety	<input checked="" type="checkbox"/>	<input type="checkbox"/>	
<input checked="" type="checkbox"/>	<input type="checkbox"/>	10. การทำงานของระบบทำความเย็น	<input checked="" type="checkbox"/>	<input type="checkbox"/>	
<input type="checkbox"/>	<input type="checkbox"/>	11. การทำงานของระบบทำความร้อน	<input type="checkbox"/>	<input type="checkbox"/>	ไม่มี
<input checked="" type="checkbox"/>	<input type="checkbox"/>	12. สลักตัวเครื่อง	<input checked="" type="checkbox"/>	<input type="checkbox"/>	
<input checked="" type="checkbox"/>	<input type="checkbox"/>	13. สลักควบคุมอุณหภูมิ	<input checked="" type="checkbox"/>	<input type="checkbox"/>	

ข้อเสนอแนะ:

Mr. Thanetrit Raksaporn  
Service Engineer

บริษัท เทคโนโลยี โปรโมชัน จำกัด  
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## 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
1	pH Meter	pH	HANNA	LAQUA-PH210 HMM0046	Technology Promotion Association (Thailand-Japan)	260340	11 Jan 24	9 Jan 25	



TECHNOLOGY PROMOTION ASSOCIATION (THAILAND-JAPAN)  
CORPORATE SERVICES 3: EQUIPMENT CALIBRATION AND TESTING SERVICES  
534N PATTANAKARN ROAD SOI 18, SUANLUANG, SUANLUANG BANGKOK 10250  
TEL: 0-2717-3000-29 FAX: 0-2716-9424

Cert.No.: 24CH40  
Page.: 1 of 3

## Certificate of Calibration

Equipment : pH Meter  
Manufacturer : Horiba  
Model : LAQUA-PH210  
Serial No. : HA9M0046  
ID No. : UAE-EFM.001/2553(EFM.pH.01/83)  
Condition As-Received: Used Item  
Received Date : 06 January 2024  
Calibration Date : 10 January 2024  
Reference : 2401-0219WSC-3  
Submitted by : United Analyst and Engineering Consultant Co., Ltd.  
3 Soi Udomsak 41, Sukhumvit Road,  
Bangchak, Phrakhanong, Bangkok 10260  
Ambient Temperature : (25 ± 2.5) °C  
Relative Humidity : (50 ± 15) %  
Calibration Procedure : In - house method :  
- CP-CH5 by direct measurement with standard  
voltage calibrator and direct measurement with  
certified reference material (CRM)  
- CP-CHB by comparison with standard thermometer

Calibrated by : Warakom Lemgagrakul

Approved by :   
Approved Signatory(✓) Sathip Meangmal  
( ) Warakom Lemgagrakul  
( ) Ponpan Paipim

Issue Date : 15 January 2024

The Uncertainties are for a confidence probability of approximately 95 %

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

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A 0062456Cert.No.: 24CH40  
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	54090049	130RC116	23E2802	27 Aug 2024
2) Ref. Standard Thermometer	4682054	110RC044	23B008	26 July 2024

This certification is traceable to the International System of Unit maintained through:-  
- Technology Promotion Association (Thailand-Japan)

2. Certified Reference Materials : The measurement results are traceable to SI through CPA chem Ltd.,  
ANSI-ASQ National Accreditation Board, Accredited No. AR-1635

Buffer Solution	Manufacturer	Lot No.	Exp. date
pH 4.008	CPA chem	940102	27 Nov 2025
pH 6.866	CPA chem	931959	01 Oct 2024
pH 9.997	CPA chem	940108	02 Nov 2024

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 Fluke at pH (4,7)(7,10)

Unit Under Calibration	Nominal Value	Standard Voltage Input	Actual Reading		Uncertainty of Measurement (±mV)	Coverage factor k
			mV	pH		
pH Meter S/N.: HA9M0046	4.00	177.48	177.5	4.01	0.058	2.00
	7.00	0.00	0.2	7.00	0.058	2.00
	7.00	0.00	0.2	7.00	0.058	2.00
	10.00	-177.48	-177.0	10.01	0.058	2.00

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Cert.No.: 24CH40

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 $k$
pH Electrode S/N.: -	4.006	4.01	171.9	0.0079	2.00
	6.986	6.99	-2.2	0.0093	2.00
	6.986	6.99	-3.6	0.0093	2.00
	9.997	10.01	-171.0	0.011	2.07

**Function : Temperature Measurement**

(\*) Without adjustment

This equipment was connected with Temperature Probe;

- Model : -

- Serial No. : -

Dimension of probe;

- Length : 103 mm

- Diameter : 16 mm

- Immersion Depth : 90 mm

Calibration Point (°C)	Standard Temperature (°C)	UUC* Reading (°C)	Error (°C)	Uncertainty of measurement ( $\pm$ °C)	Coverage factor $k$
25.0	25.002	25.0	-0.002	0.13	2.00
30.0	30.002	30.0	-0.002	0.13	2.00
35.0	35.003	35.0	-0.003	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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*Sattip*  
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a 1197724