

ภาคผนวก ค  
เอกสารสอบเทียบเครื่องมือ

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รายการใบรับรองสอบเทียบเครื่องมือหลักประจำห้องปฏิบัติการสำหรับวิเคราะห์คุณภาพสิ่งแวดล้อม

No.	Instrument/Equipment	Parameter	Manufacturer	Model/Serial No.	Calibrator	Certification No.	Date of Calibration	Due date of Calibration*	Remark
เครื่องมือสำหรับวิเคราะห์คุณภาพน้ำ									
1	pH Meter	pH Temperature	Mettler-Toledo	Seven Easy S20 / 1230525212	National Food Institute, Ministry of Industry, Thailand	2202093-001-01	16 Mar 22	15 Mar 23	-
2	pH Meter		Mettler-Toledo	SevenCompact S220/ C113432421	National Food Institute, Ministry of Industry, Thailand	2203527-001-01	5 Jul 21	4 Jul 22	-
3	BOD Incubator	Biochemical Oxygen Demand	Arco	UR-1320 / (UAE.WAO.006/2553)	Technology Promotion Association (Thailand-Japan)	22TM306	7 Apr 22	6 Apr 23	-
4	BOD Incubator		Arco	UC4-1320 / (UAE.WAO.002/2550)	Technology Promotion Association (Thailand-Japan)	21TM1405	17 Aug 21	16 Aug 22	-
5	Analytical Balance (Readability 0.01 mg)	Total Suspended Solids Total Dissolved Solids	Mettler-Toledo	AX105DR / 1122100406	National Food Institute, Ministry of Industry, Thailand	2200708-001-01	24 Nov 21	23 Nov 22	-
6	Hot Air Oven		Memmert	UF55 / B216.1666	Technology Promotion Association (Thailand-Japan)	21TM1876	29 Oct 21	28 Oct 22	-
7	Analytical Balance (Readability 0.1 mg)	Fat oil & Grease	Mettler-Toledo	XSR204 / C117635043	National Food Institute, Ministry of Industry, Thailand	2202934-001-01	13 May 22	12 May 23	-
8	UV-VIS Spectrophotometer		Agilent Technologies	Cary60 G6860A / MY15410009	DOE Services Co.,Ltd.	SP22-016	31 May 22	30 May 23	-
9	UV-VIS Spectrophotometer		Hitachi	U-1900 / 2021-064	DOE Services Co.,Ltd.	SP22-007	20 Jan 22	19 Jan 23	-
10	UV-VIS Spectrophotometer		Hitachi	U-2900 / 21E22-009	DOE Services Co.,Ltd.	SP22-008	20 Jan 22	19 Jan 23	-
11	Distillation Unit (Kjeldahl Method)	Total Kjeldahl Nitrogen (TKN)	FOSS TECATOR	KT200 / 91790524	FOSS South East Asia	5874	30 Nov 21	29 Nov 22	-

รายการใบรับรองสอบเทียบเครื่องมือหลักประจำห้องปฏิบัติการสำหรับวิเคราะห์คุณภาพสิ่งแวดล้อม

No.	Instrument/Equipment	Parameter	Manufacturer	Model/Serial No.	Calibrator	Certification No.	Date of Calibration	Due date of Calibration*	Remark
เครื่องมือสำหรับวิเคราะห์คุณภาพน้ำ									
12	Incubator (Cooled Incubator)	Fecal Coliform Total Coliform Bacteria	Memmert	IN 75 / D317.0307	Technology Promotion Association (Thailand-Japan)	22TM671	3 May 22	2 May 23	-
13	Incubator	E.coli Staphylococcus aureus	Memmert	INB400 / E411.1325	Technology Promotion Association (Thailand-Japan)	21TM1357	14 Jul 21	13 Jul 22	-
14	Water Bath	Pseudomonas aeruginosa	Memmert	WNE 14 / L416.0614	Technology Promotion Association (Thailand-Japan)	22TM332	17 Feb 22	16 Feb 23	-
15	Water Bath		Memmert	WB 14 / I401.0569	Technology Promotion Association (Thailand-Japan)	21TM1355/1	14 Jul 21	13 Jul 22	-
16	Auto Clave		ALP	CL-40L / 802664	Technology Promotion Association (Thailand-Japan)	22TM89	17 Feb 22	16 Feb 23	-

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

# Calibration Certificate

Certificate No.: 2202093-001-01  
Client name: UNITED ANALYST AND ENGINEERING CONSULTANT CO.,LTD.  
Address: 3 Sol Udomsuk 41, Sukhumvit Road,  
Bangchack, Prakanong, Bangkok 10260

Page 1 of 5

Equipment:	pH Meter
Manufacturer:	METTLER TOLEDO
Model:	SevenEasy pH
Serial No.:	1230525212
ID No.:	UAE.WAS.003/2553

Order No.:	2202093
Operation No.:	2202093-001
Date of Receipt:	11 March 2022
Date of Calibration:	16 March 2022

Calibrated by **Mr. Manas Somsak**  
Specialist  
Approved by **( Mr. Pheraphat Tuanjit )**  
Manager, Division of Calibration Laboratory  
Responsible for the Technical Management Team  
Date of Issue: **21 March 2022**

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: 00 Date: 14-12-61

# เอกสารไม่ควบคุม

# Calibration Report

**Certificate No.:** 2202095-001-01  
**Equipment:** pH Meter  
**Manufacturer:** METTLER TOLEDO  
**Serial No.:** 1230525212  
**ID No.:** UAE.WAS.003/2553

Date of Calibration: 16 March 2022

**Location:** Chemical Calibration Laboratory, National Food Institute.

Environment Condition: Ambient Temperature: ( 23.0 ± 1.5 ) °C Relative Humidity: ( 49.5 ± 5 ) %

Condition of Equipment: Good Condition

### Condition of this Results of Calibration

1. Calibration Method

## 2. Reference Standards / Certified Reference Material

Instruments	Serial / ID No.	Manufacturer	Certificate No.	Due Date
2.1 DC Voltage Calibrator	2709007	Fluke	SCL-21F-0687	24 June 2022
2.2 Digital Thermometer	2709007	Fluke	CC-940599-01	30 October 2022
2.3 Thermo-Hygro Meter	886-AHLSTH 005/68	PONPE	QR21-2787	15 November 2022

Certified Reference Material	Lot. No.	Manufacturer	Ref. N.	Expiry Date
2.4 pH buffer 4.008 (Primary pH buffer Solution)	780012	CPAchem	PH216.L5	21 November 2023
2.5 pH buffer 6.865 (Primary pH buffer Solution)	780013	CPAchem	PH217.L5	21 November 2023
2.6 pH buffer 10.01 (Primary pH buffer Solution)	780015	CPAchem	PH220.L5	21 November 2022
2.7 pH buffer 7.00 (Standard pH buffer Solution)	776840	CPAchem	PH107.L5	8 November 2022

3. This certification is traceable to The International System of Unit (SI Unit)

3.1 Instruments No.2.1

3.2 Instruments No.2.2

3.3 Instruments No.2.3

3.4 Certified Reference Material No. 2.4 to 2.6 traceable to Primary measurement method- Harned cell using calibrated

thermometer, barometer, and nanovoltmeter. The Standard Solution preparation and certified by CPAchem Ltd is accredited to ISO 17034

and ISO/IEC 17025

3.5 Certified Reference Material No. 2.7 traceable to  
BIM RefN HI-7 LotN 30.04.2020; BIM RefN HI-9 LotN 28.05.2020; BIM  
RefN HI-8 LotN 30.04.2020; BIM RefN HI-10 LotN 28.05.2020. The

Standard Solution preparation and certified by CPAchem Ltd is accredited to ISO 17024 and ISO/IEC 17025

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## เอกสารไม่ควบคุม

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F-CS-012 Revision: 00 Date: 14-12-61



## Calibration Report

Certificate No.: 2202093-001-01  
Equipment: pH Meter  
Resolution: 0.01 pH ; 1 mV  
Manufacturer: METTLER TOLEDO  
Model: SevenEasy pH  
Serial No.: 1230525212  
Type: Bench top  
ID No.: UAE.WAS.003/2553  
Date of Calibration: 16 March 2022  
Calibration Results: ( Manual Temperature Compensation at 25 °C )  
1. Calibration of pH Meter

Page 3 of 5

Nominal pH	DC Voltage Standard (mV)	Average Indicator Reading		Uncertainty (±mV)	Coverage Factor (k)
		mV	pH		
0	414.117	414	0.00	0.58	2.00
2	295.811	296	2.00	0.58	2.00
4	177.462	178	4.00	0.58	2.00
6	59.169	59	6.00	0.58	2.00
7	-0.001	0	7.00	0.58	2.00
8	-59.169	-59	8.00	0.58	2.00
10	-177.463	-177	10.00	0.58	2.00
12	-295.812	-296	12.00	0.58	2.00
14	-414.119	-414	14.00	0.58	2.00

2. Calibration of pH Meter with Electrode ( Manual Temperature Compensation at 25 °C )  
Equipment: pH Electrode  
Type: Combined Electrode  
Manufacturer: METTLER TOLEDO  
Model: InLab Solids  
Serial No.: 9453943  
ID No.: N/A  
Performance of Electrode system (Three-Point Calibration at pH4, pH7 and pH10)

Certified Value @25 °C (pH)	Average Indicator Reading		Relative Slope (%)	Uncertainty (± pH)	Coverage Factor (k)
	pH	mV			
4.008	4.01	172	98.1	0.0071	2.00
6.866	6.87	6	-	0.0074	2.00
10.015	10.01	-175	97.4	0.0090	2.00
6.983	6.98	-3	-	0.0092	2.00

## Calibration Report

Certificate No.: 2202093-001-01  
Equipment: Digital Thermometer with RTD (pH Meter)  
Resolution: 0.1 °C  
Model: SevenEasy pH  
Serial No.: 1230525212  
ID No.: UAE.WAS.003/2553  
Manufacturer: METTLER TOLEDO  
Date of Calibration: 16 March 2022  
Page 4 of 5

Location: Chemical Calibration Laboratory, National Food Institute.  
Environment Condition:  
Ambient Temperature ( 23.0 ± 1.0 ) °C  
Relative Humidity ( 50 ± 4 ) %

### Condition of this results of Calibration:

1. Calibration Method :
- In house method: W-TE-025 by comparison with standard thermometer.
  - The Calibration is determined by comparing with a known temperature from a standard resistance thermometer.
  - The temperature scale in use at this laboratory is the International Temperature scale of 1990 ( ITS-90 ).
2. Reference Standard Instrument :

Instrument	Model	Serial No.	Certificate No.	Due Date	Through
HANDHELD THERMOMETER Platinum Resistance Thermometer (PRT)	1523	2118154	PSL-T 0851/64	24-Jun-22	TISTR
	5627A	877332			

Support Equipment : - Low Temperature Bath (ISOCAL-6), Model: Europa-6 Plus Basic, SIN: 341592/2

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

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## Calibration Report

Certificate No.: 2203527-001-01

Equipment: pH Meter Resolution: 0.01 pH ; 1 mV  
Manufacturer: METTLER TOLEDO Model: Seven Compact S220  
Serial No.: C113432421 Type: Bench top  
ID No.: UAE.WAT.009/2564

Date of Calibration: 5 July 2022

Location: Calibration Laboratory, National Food Institute

Environment Condition: Ambient Temperature: ( 23.5 ± 1.5 ) °C Relative Humidity: ( 53 ± 5 ) %

Condition of Equipment: Good Condition

### Condition of this Results of Calibration

1. Calibration Method In house method : W-CC-002 based on direct measurement by using standard voltage calibrator and certified reference material (CRM)

2. Reference Standards / Certified Reference Material

Instruments	Serial / ID No.	Manufacturer	Certificate No.	Due Date
2.1 DC Voltage Calibrator	2709007	Fluke	22E1959	17 June 2023
2.2 Digital Thermometer	2709007	Fluke	CC-640599-01	30 October 2022
2.3 Thermo-Hygro Meter	NF1BTH005/18	PONPE	QR22-0351	18 February 2023
Certified Reference Material	Lot. No.	Manufacturer	Ref.N	Expiry Date
2.4 pH buffer 4.008 (Primary pH buffer Solution)	805203	CPAchem	PH216.L5	21 April 2024
2.5 pH buffer 6.865 (Primary pH buffer Solution)	805204	CPAchem	PH217.L5	21 April 2024
2.6 pH buffer 10.01 (Primary pH buffer Solution)	805205	CPAchem	PH220.L5	21 April 2023
2.7 pH buffer 7.00 (Standard pH buffer Solution)	805206	CPAchem	PH107.L5	21 April 2023

3. This certification is traceable to The International System of Unit (SI Unit)

3.1 Instruments No.2.1	through	NSC-TIS-TIS 17025 Laboratory Accreditation of Calibration No.0075
3.2 Instruments No.2.2	through	NSC-TIS-TIS 17025 Laboratory Accreditation of Calibration No.0061
3.3 Instruments No.2.3	through	NSC-TIS-TIS 17025 Laboratory Accreditation of Calibration No.0292
3.4 Certified Reference Material No. 2.4 to 2.6	traceable to	Primary measurement method- Harned cell using calibrated thermometer, barometer, and nanovoltmeter. The Standard Solution preparation and certified by CPAchem Ltd is accredited to ISO 17034 and ISO/IEC 17025
3.5 Certified Reference Material No.2.7	traceable to	BIM ReIN Hi-27 LoIN 04.06.2021; BIM ReIN Hi-28 LoIN 28.05.2021; BIM ReIN Hi-27 LoIN 04.06.2021; BIM ReIN Hi-28 LoIN 28.05.2021, the Standard Solution preparation and certified by CPAchem Ltd is accredited to ISO 17034 and ISO/IEC 17025

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.

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

## Calibration Report

Certificate No.: 2203527-001-01

Equipment: pH Meter Resolution: 0.01 pH ; 1 mV  
Manufacturer: METTLER TOLEDO Model: Seven Compact S220  
Serial No.: C113432421 Type: Bench top  
ID No.: UAE.WAT.009/2564

Date of Calibration: 5 July 2022

Calibration Results: ( Manual Temperature Compensation at 25 °C )  
1. Calibration of pH Meter

Nominal pH	DC Voltage Standard (mV)	Average Indicator Reading		Uncertainty (±mV)	Coverage Factor (k)
		mV	pH		
0	414.117	414	0.00	0.58	2.00
2	295.811	296	2.00	0.58	2.00
4	177.462	177	4.00	0.58	2.00
6	59.159	59	6.00	0.58	2.00
7	-0.001	0	7.00	0.58	2.00
8	-59.159	-59	8.00	0.58	2.00
10	-177.463	-177	10.00	0.58	2.00
12	-295.812	-296	12.00	0.58	2.00
14	-414.119	-414	14.00	0.58	2.00

2. Calibration of pH Meter with Electrode ( Manual Temperature Compensation at 25 °C )

Equipment: pH Electrode Type: Combined Electrode  
Manufacturer: METTLER TOLEDO Model: InLab Expert Pro-ISM  
Serial No.: 2210418 ID No. N/A

Performance of Electrode system (Three-Point Calibration at pH4, pH7 and pH10)

Certified Value @25 °C (pH)	Average Indicator Reading		Relative Slope (%)	Uncertainty (± pH)	Coverage Factor (k)
	pH	mV			
4.008	4.010	182	-	0.0071	2.00
6.865	6.850	14	100.0	0.0075	2.00
10.008	10.010	-169	97.9	0.0093	2.00
6.985	6.990	6	-	0.0087	2.00

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



## Calibration Report

**Certificate No.:** 2203527-001-01

**Equipment:** Digital Thermometer with RTD

**Resolution:** 0.1 °C **Model:** Seven Compact S220

**Serial No.:** C113432421 **ID No.:** UAE.WAT.009/2564

**Manufacturer:** METTLER TOLEDO

**Date of Calibration:** 5 July 2022

Page 4 of 5

**Location:** Calibration Laboratory, National Food Institute

**Environment Condition:** Ambient Temperature 25 °C ± 1 °C

Relative Humidity 48 % ± 3 %

### Condition of this results of Calibration:

1. Calibration Method : - In house method: W-TE-025 by comparison with standard thermometer.  
 - The Calibration is determined by comparing with a known temperature from a standard resistance thermometer.  
 - The temperature scale in use at this laboratory is the International Temperature scale of 1990 ( ITS-90 ).
2. Reference Standard Instrument :

Instrument	Model	Serial No.	Certificate No.	Due Date	Through
HANDHELD THERMOMETER	1521	A85997	TE 650057-01	10-Dec-22	NATIONAL FOOD INSTITUTE
Platinum Resistance Thermometer (PRT)	385	509201			

Support Equipment : - Low Temperature Bath (ISOCAL-6), Model: Europa-6 Plus Basic, S/N: 341592/2

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

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

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

*Atz*

## Calibration Report

**Certificate No.:** 2203527-001-01

**Equipment:** Digital Thermometer with RTD

**Resolution:** 0.1 °C **Model:** Seven Compact S220

**Serial No.:** C113432421 **ID No.:** UAE.WAT.009/2564

**Manufacturer:** METTLER TOLEDO

**Date of Calibration:** 5 July 2022

Page 5 of 5

**Calibration point:** 15.0, 25.0 and 35.0 °C

**Calibration result:**

- The probe was immersed in liquid bath or dry bath to a minimum depth of 120 mm.

- Description of probe, model : - S/N : -

Dimension of probe : Diameter 9 mm., Length 120 mm.,

Sheath material : Stainless Steel

UUC* Reading (°C)	Standard Temperature (°C)	Correction Value (°C)	Uncertainty ± (°C)
15.1	15.038	- 0.1	0.12
25.1	25.038	- 0.1	0.12
35.2	35.024	- 0.2	0.12

### Note

- UUC\* : Unit Under Calibration

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 -----

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

*Atz*



TECHNOLOGY PROMOTION ASSOCIATION (THAILAND-JAPAN)  
CORPORATE SERVICES 3: EQUIPMENT CALIBRATION AND TESTING SERVICES  
534/4 PATTANAKARN ROAD SOI 18, SUANLUANG, SUANLUANG BANGKOK 10250  
TEL. 0-2717-3000-27 FAX. 0-2719-9484



NSC-TISI-TISI7025  
CALIBRATION 0008

Cert. No.: 22TM306  
Page.: 1 of 3

## Certificate of Calibration

Equipment : BOD Incubator

Manufacturer : ARCO

Model : UR-1320

Serial No. : -

ID No. : UAE.WAO.006/2553

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 : 7 April 2022

Calibration Date : 7 April 2022

Ambient Temperature :  $(20 \pm 10) ^\circ\text{C}$

Relative Humidity :  $(50 \pm 30) \%$

Calibrated by : Man Pattanapongpaiboon

Approved by :

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

Approved Signatory

Issue Date :

18 April 2022

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

A 0040247



Equipment : BOD Incubator

Condition As-Received : Used Item

Reference : 2204-00150C-3

Cert. No.: 22TM306  
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 34970A MY41021843 22LM4 10 Jan 2023

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

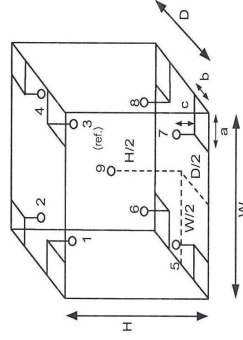
3. This certification is traceable to the International System of Unit.

Result of Calibration :- ( \* ) Without Adjustment

Function of UUC\* : Temperature Source

Fresh air setting : Not Available

Environment during calibration		
	Beginning	Finished
Temp. ( °C )	27	27
REL.Humid. ( % )	59	57
AC Supply ( Volt )	221	220



Probe Installation Details : Dimension of Chamber :  
a = 10 cm D = 0.62 m  
b = 10 cm W = 1.2 m  
c = 10 cm H = 1.2 m  
Capacity = 0.89 m<sup>3</sup>

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

เอกสารไม่ควบคุม

เอกสารไม่ควบคุม

A 1104312



**Equipment :** BOD Incubator  
**Condition As-Received :** Used Item  
**Reference :** 2204-00150C-3  
**Result of Calibration :-** ( \* ) Without Adjustment  
**Function of UUC\* :** Temperature Source  
**Fresh air setting :** Not Available

**Cert. No.:** 22TM306  
**Page:** 3 of 3

Calibration Point (°C)	Measured Temperature (°C)					Overall Variation (°C)	Uncertainty (±°C)	Coverage Factor k
	1	2	3	4	5			
20.0	20.176	20.413	19.711	19.637	20.218	20.286	19.639	19.922

**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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Malee

เอกสารไม่ควบคุม

a 1104311



**TECHNOLOGY PROMOTION ASSOCIATION (THAILAND-JAPAN)**  
**CORPORATE SERVICES 3: EQUIPMENT CALIBRATION AND TESTING SERVICES**  
534/4 PATTANAKARN ROAD SOI 18, SUANLUANG, SUANLUANG BANGKOK 10250  
TEL. 0-2717-3000-27 FAX. 0-2719-9484



NSC-TSI-TS17025  
CALIBRATION 0008

**Cert. No.:** 22TM306  
**Page:** 1 of 3

## Certificate of Calibration

**Equipment :** BOD Incubator

**Manufacturer :** ARCO

**Model :** UR-1320

**Serial No. :** -

**ID No. :** UAE.WAO.006/2553

**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 :** 7 April 2022

**Calibration Date :** 7 April 2022

**Ambient Temperature :** ( 26 ± 10 ) °C

**Relative Humidity :** ( 50 ± 30 ) %

**Calibrated by :** Man Pattanapongpaiboon

**Approved by :**  Approved Signatory

( ) Ponthippa Tameyakul

( ) Malee Butkruea

( ) Suwit Imjai

**Issue Date :** 18 April 2022

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

A 0040247





**Equipment :** BOD Incubator  
**Condition As-Received :** Used Item  
**Reference :** 2204-00150C-3

**Cert. No.:** 22TM306  
**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.

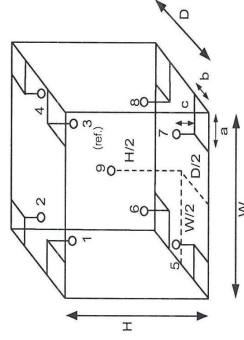
**Condition of this result of calibration**

1. Reference standard Instrument:-
- 1 ) Data Acquisition  
Model 34970A  
Serial No. MY41021843  
Cert. No. 22LM4  
Due Date 10 Jan 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 :** Not Available



**Probe Installation Details :**

**Dimension of Chamber :**  
a = 10 cm  
b = 10 cm  
c = 10 cm  
D = 0.62 m  
W = 1.2 m  
H = 1.2 m  
Capacity = 0.89 m<sup>3</sup>

Environment during calibration		
	Beginning	Finished
Temp. ( °C )	27	27
REL.Humid. ( % )	59	57
AC Supply ( Volt )	221	220

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

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๑ 1104312



**Equipment :** BOD Incubator  
**Condition As-Received :** Used Item  
**Reference :** 2204-00150C-3

**Cert. No.:** 22TM306  
**Page.:** 3 of 3

**Result of Calibration :-**

**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 )	Uncertainty ( ±°C )	Coverage Factor <i>k</i>		
20.0	20.0	19.9	0.33	0.68	1.4	0.50	2		
Measured Temperature ( °C )									
Position									
1	2	3	4	5	6	7	8	9 (ref.)	
20.0	20.176	20.413	19.711	19.637	20.218	20.286	19.639	19.642	19.922

**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 1104311

## Calibration Certificate

**Certificate No.:** 2200708-001-01  
**Client name:** UNITED ANALYST AND ENGINEERING CONSULTANT CO.,LTD.  
**Address:** 3 Soi Udomsuk 41, Sukhumvit Road,  
Bangchack, Prakhonong, Bangkok 10260

Page 1 of 4

**Equipment:** Electronic Balance

**Manufacturer:** METTLER TOLEDO

**Model:** AX 105 DR

**Serial No.:** 1122100406

**ID No.:** UAE.WAO.004/2546

**Order No.:** 2200708

**Operation No.:** 2200708-001

**Date of Receipt:** 24 November 2021

**Date of Calibration:** 24 November 2021

**Calibrated by** Mr.Worapob Sooktong  
**Approved by** ( Mr.Pheraphat Tuanjit )  
Scientist  
Manager, Division of Calibration Laboratory

**Date of Issue:** 30 November 2021  
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.

## Calibration Report

**Certificate No.:** 2200708-001-01  
**Equipment:** Electronic Balance  
**Manufacturer:** METTLER TOLEDO  
**Model:** AX 105 DR  
**Resolution:** 0.00001 g/ 0.0001 g  
**Serial No.:** 1122100406  
**ID No.:** UAE.WAO.004/2546  
**Capacity:** 110 g

Page 2 of 4

**Date of Calibration:** 24 November 2021

**Environment Condition:** Ambient Temperature: 22.0 ± 0.5 °C Relative Humidity: 39 ± 1 %

**Place of Calibration:** 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	1-500mg	15880	TCS	M20111955	28 November 2021
Standard Weight Class E2	1-500g	15882	TCS	M20111965	28 November 2021
Instrument	Thermo-Hygro Meter	11A1	สวท.อ.อ.ล. BTH 003/55	Quality Reborn	15 February 2022
				QR21-0297	

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 )
15	0.0000057
30	0.0000084
50	0.000053
100	0.000048

2. Off-Center Error:

A mass of 50 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 )
50.0000	50.0000	49.9999	50.0000	49.9999	49.9999	0.0001



## Calibration Report

**Certificate No.:** 2200708-001-01

**Equipment:**

Electronic Balance

**Manufacturer:** METTLER TOLEDO

**Resolution:** 0.00001 g/ 0.0001 g

**Model:** AX 105 DR

**ID No.:** UAE.WAO.004/2546

**Serial No.:** 1122100406

**Capacity:** 110 g

**Date of Calibration:** 24 November 2021

Page 3 of 4

**Calibration Results:** (Continued)

**Calibration Range:** 0-100 g

**Calibration Adjustment:** Internal Calibration

**3. Departure from Nominal Value:** ( Range: 0 - 30 g ; Resolution: 0.00001 g )

Nominal Value ( g )	Standard Value ( g )	Average Reading ( g )	Correction ( g )	Uncertainty ( ± g )	Coverage Factor k
Unload	0.000000	0.00000	0.00000	0.0000089	2.00
0.01	0.009998	0.01000	0.00000	0.000011	2.00
0.02	0.019997	0.02000	0.00000	0.000012	2.00
0.05	0.050001	0.05000	0.00000	0.000011	2.00
0.1	0.100002	0.10000	0.00000	0.000012	2.00
0.2	0.200004	0.20000	0.00000	0.000013	2.00
0.5	0.499994	0.50000	-0.00001	0.000014	2.00
1	0.999986	1.00000	-0.00001	0.000026	2.00
2	1.999989	1.99998	0.00001	0.000019	2.00
5	4.999979	4.99998	0.00000	0.000022	2.00
10	10.000026	9.99994	0.00009	0.000074	2.00
20	20.000037	19.99991	0.00013	0.000099	2.00
30	30.000063	30.00000	0.00006	0.00013	2.00

## Calibration Report

**Certificate No.:** 2200708-001-01

**Equipment:**

Electronic Balance

**Manufacturer:** METTLER TOLEDO

**Resolution:** 0.00001 g/ 0.0001 g

**Model:** AX 105 DR

**Serial No.:** 1122100406

**Capacity:** 110 g

**Date of Calibration:** 24 November 2021

Page 4 of 4

**Calibration Results:** (Continued)

**Calibration Range:** 0-100 g

**Calibration Adjustment:** Internal Calibration

**3. Departure from Nominal Value:** ( Range: 31 - 100 g ; Resolution: 0.0001 g )

Nominal Value ( g )	Standard Value ( g )	Average Reading ( g )	Correction ( g )	Uncertainty ( ± g )	Coverage Factor k
40	40.00000	39.9999	0.0001	0.00014	2.00
45	44.99998	44.9999	0.0001	0.00015	2.00
50	49.99999	49.9999	0.0001	0.00016	2.00
55	54.99997	54.9998	0.0002	0.00016	2.00
60	60.00002	59.9999	0.0001	0.00018	2.00
65	65.00000	64.9999	0.0001	0.00018	2.00
70	70.00003	69.9999	0.0001	0.00019	2.00
75	75.00001	74.9999	0.0001	0.00020	2.00
80	80.00005	79.9998	0.0003	0.00021	2.00
85	85.00003	84.9998	0.0002	0.00022	2.00
90	89.99999	89.9998	0.0002	0.00021	2.00
100	99.99997	99.9998	0.0002	0.00020	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 %.



TECHNOLOGY PROMOTION ASSOCIATION (THAILAND-JAPAN)  
CORPORATE SERVICES 3: EQUIPMENT CALIBRATION AND TESTING SERVICES  
534/4 PAITANAKARN ROAD SOI 18, SUANLUANG, SUANLUANG BANGKOK 10250  
TEL. 0-2717-3000-27 FAX. 0-2719-9484



NIST-TLS 7025  
CALIBRATION 0008

Cert. No.: 21TM1876  
Page.: 1 of 3

## Certificate of Calibration

**Equipment :** Hot Air Oven  
**Manufacturer :** Memmert  
**Model :** UF 55  
**Serial No. :** B216.1666  
**ID No. :** UAE.WAO.027/2559  
**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 :** 29 October 2021  
**Calibration Date :** 29 October 2021  
**Ambient Temperature :** ( 26 ± 10 ) °C  
**Relative Humidity :** ( 50 ± 30 ) %  
**Calibrated by :** Kunchit Promprat  
**Approved by :**   
( ) Pornthippa Tameyakul  
( ) Malee Butkruea  
( ) Suwit Imjai  
**Issue Date :** 4 November 2021

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 :** Hot Air Oven  
**Condition As-Received :** Used Item  
**Reference :** 2110-0701OC-1  
**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	34970A	MY44067817	21LM10	20 Jul 2022

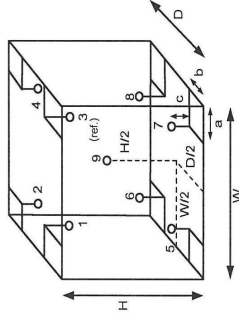
2. This certificate is valid only to the item calibrated on date and place of calibration.

3. This certificate 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 :

a =	5.0 cm	D =	0.33 m
b =	5.0 cm	W =	0.40 m
c =	5.0 cm	H =	0.40 m
		Capacity =	0.053 m <sup>3</sup>

### Dimension of Chamber :

Environment during calibration	
Temp. ( °C )	Beginning 28 Finished 28
REL.Humid. ( % )	56 55
AC Supply ( Volt )	230 230

Ref. Std. ID No.: @	
Position :	( 140, 180 ) °C ( 104 ) °C Calibration Point
1	21-15TC-01 15RTD2/11
2	21-15TC-02 15RTD2/12
3	21-15TC-03 15RTD2/13
4	21-15TC-04 15RTD2/14
5	21-15TC-05 15RTD2/15
6	21-15TC-06 15RTD2/20
7	21-15TC-07 15RTD2/17
8	21-15TC-08 15RTD2/18
9 (ref.)	21-15TC-09 15RTD2/19

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**Equipment :** Hot Air Oven  
**Condition As-Received :** Used Item  
**Reference :** 2110-0701OC-1  
**Result of Calibration :-** ( \* ) Without Adjustment  
**Function of UUC\* :** Temperature Source  
**Fresh air setting :** Close

**Cert. No.:** 21TM1876  
**Page.:** 3 of 3

Calibration Point ( °C )	UUC* Setting ( °C )	UUC* Reading ( °C )	Temperature stability ( ± °C )	Temperature uniformity ( °C )	Overall Variation ( °C )	Uncertainty ( ± °C )	Coverage Factor <i>k</i>
104.0	104.0	104.0	0.11	0.52	0.72	0.42	2
140.0	140.0	140.0	0.25	1.1	1.4	1.1	2
180.0	180.0	180.0	0.18	0.87	1.2	1.1	2

Calibration Point ( °C )	Measured Temperature ( °C )								
	Position								
	1	2	3	4	5	6	7	8	9 (ref.)
104.0	103.852	103.978	104.382	104.323	103.776	104.015	104.312	104.196	103.907
140.0	140.309	140.730	140.426	140.270	139.531	139.666	140.067	139.895	139.750
180.0	180.598	180.339	180.755	180.619	179.716	179.829	180.204	180.365	179.975

**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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มูลนิธิสถาบันพัฒนาเพื่ออุตสาหกรรม  
Food Institute for Industrial Development National Food Institute  
Foundation for Industrial Laboratory Service Center  
Food Industrial Laboratory Service Center  
national food institute  
ministry of industry

## Calibration Certificate

**Certificate No.:** 2202934-001-01  
**Client name:** UNITED ANALYST AND ENGINEERING CONSULTANT CO., LTD.  
**Address:** 3 Soi Udomsuk 41, Sukhumvit Road,  
Bangchack, Prakhnong, Bangkok 10260

Page 1 of 4

**Equipment:** Electronic Balance  
**Manufacturer:** METTLER TOLEDO  
**Model:** XSR204  
**Serial No.:** C117635043  
**ID No.:** UAE.WAS.012/2564  
**Order No.:** 2202934  
**Operation No.:** 2202934-001  
**Date of Receipt:** 13 May 2022  
**Date of Calibration:** 13 May 2022

**Calibrated by** Mr.Manas Somsak  
Specialist  
**Approved by** ( Mr.Pheraphat Tuanjit )  
Manager, Division of Calibration Laboratory  
Responsible for the Technical Management Team  
**Date of Issue:** 25 May 2022

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

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เอกสารไม่ควบคุม  
2008 35 ถนนสุขุมวิท แขวงบางเขน เขตบางพลี กรุงเทพมหานคร  
2008 Soi 35, Aun Aunin Road, Bang Yi Khan Subdistrict, Bang Phlat District, Bangkok 10700, Thailand  
Tel: +66(0) 2422 8688 Fax: +66(0) 2422 8545



# Calibration Report

**Certificate No.:** 2202934-001-01

**Equipment:**

**Manufacturer:** METTLER TOLEDO

Model: XSR204

Resolution: 0.0001 a

Serial No.: C117635043

ID No.: UAE.WAS.012/2564

Capacity: 220 g

Date of Calibration: 13 May 2022

Page 2 of 4

Environment Condition:			
Ambient Temperature	22.3 ± 0.1 °C	Relative Humidity:	47 ± 3 %

**Place of Calibration:** Balance room (Water Analysis Unit), 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 Standards

Due Date

Standard Weight Class E2 1ma to 200a

TCS M2204137S

Instrument	Model
------------	-------

Corporated By Certificate

Thermo-Hygro Meter

Jillie Rehorn 0822-0350

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:

### Calibration Results:

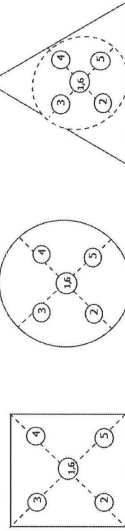
### 1. Repeatability of Reading:

Nominal Value ( g )	Standard Deviation of Reading ( g )
100	0.000033
200	0.000032

## 2. Off-Center Error:

A mass of 50 g was placed and moved to various position on pan.

The balance reading obtained is given in the table:



1 ( g )	2 ( g )	3 ( g )	4 ( g )	5 ( g )	6 ( g )
50 000	50 000	50 000	50 000	50 000	50 000

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

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

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## Calibration Report

**Certificate No.:** 2202934-001-01  
**Equipment:** Electronic Balance  
**Manufacturer:** METTLER TOLEDO  
**Model:** XSR204  
**Resolution:** 0.0001 g  
**Serial No.:** C117635043  
**ID No.:** UAE.WAS.012/2564  
**Capacity:** 220 g

**Date of Calibration:** 13 May 2022 Page 4 of 4

**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 k
50	50.00004	50.0001	-0.0001	0.00011	2.00
55	55.00006	55.0001	0.0000	0.00012	2.00
60	60.00005	60.0001	-0.0001	0.00012	2.00
65	65.00007	65.0002	-0.0001	0.00013	2.00
70	70.00008	70.0002	-0.0001	0.00013	2.00
75	75.00010	75.0002	-0.0001	0.00013	2.00
80	80.00009	80.0002	-0.0001	0.00014	2.00
85	85.00011	85.0002	-0.0001	0.00014	2.00
90	90.00012	90.0002	-0.0001	0.00015	2.00
100	100.00008	100.0003	-0.0002	0.00016	2.00
120	120.00011	120.0003	-0.0002	0.00018	2.00
150	150.00012	150.0004	-0.0003	0.00021	2.00
200	200.00015	200.0004	-0.0003	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 %.

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

DQE Services Co., Ltd.

**DQE Services**

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

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



## CERTIFICATE OF CALIBRATION

**Certificate No. :** SP22-016

Page 1 of 5

**Customer :** United Analyst and Engineering Consultant Co.,Ltd. (Head Office)

**Address :** 3 Soi Udomsuk 41, Sukhumvit Road, Bangchak, Phrakhanong,

Bangkok 10260

**Location of calibration :** Laboratory 315

**Equipment :** UV-Vis Spectrophotometer

**Manufacturer :** Agilent Technologies

**Model :** Cary 60

**Serial No. :** MY15410009

**ID No. :** N/A

**Received Date :** 23 May 2022

**Calibration Date :** 23 May 2022

**Issue Date :** 26 May 2022

**Condition Instrument :** Good

**Calibrated by :**

กฤษณ์

**Approved by :**

ชลธิชา

( Mr. Tanawut Rittidach )

Technical Manager

( Ms. Chonthicha Sangngern )

Quality Manager

The calibration result is applied only to the above calibrated item and was found accurate as shown on date and place of calibration only.

The measurement capability of the laboratory and its traceability to recognized national standards and to the unit 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 DQE Services Co., Ltd.

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FM-708-02 R01 1/11/2021

## REPORT OF CALIBRATION

Certificate No. : SP22-016

Page 2 of 5

**Environment Condition :** Ambient Temperature  $25 \pm 5 \text{ }^{\circ}\text{C}$

Relative humidity  $55 \pm 20 \text{ \%RH}$

**Calibration method :** In-house method CP-01 Based on ASTM E275-08

### Certified Reference Materials :

Material	Serial No.	Certificate No.	Due date
Absorbance Standard set	25760	95935	22 October 2023
Absorbance Standard set	25757	95929	22 October 2023
Wavelength Standard set	25806	95916	22 October 2023
Wavelength Standard set	25758	95915	22 October 2023

**Traceability :** This certification is traceable to the International System of Unit maintained at National -

Institute of Standards and Technology (NIST) through Starna Scientific Limited

**Spectral Band Width of UUC :** 1.5 nm.

**Scan Speed of UUC :** 90 nm/min

**Scan Interval of UUC :** 0.15 nm.

**Resolution of UUC :** Photometric 0.0001 Abs.

Wavelength 0.1 nm.

**เอกสารไม่ควบคุม**

FM-708-02 R01 1/11/2021

## REPORT OF CALIBRATION

Certificate No. : SP22-016

Page 3 of 5

**Calibration Results :** Without adjustment

### Photometric Accuracy :

Wavelength (nm.)	CRMs Values (Abs)	UUC Reading (Abs)	Correction (Abs)	Uncertainty (Abs)	Coverage factor k
420	0.0000	0.0000	0.0000	0.0028	2.00
	0.5787	0.5755	0.0032	0.0031	2.00
	1.0490	1.0436	0.0054	0.0029	2.00
	2.1900	2.1847	0.0053	0.0075	2.00
440	0.0000	0.0000	0.0000	0.0028	2.00
	0.5607	0.5588	0.0019	0.0034	2.00
	1.0247	1.0232	0.0015	0.0035	2.00
	2.1229	2.1211	0.0018	0.0082	2.00
465	0.0000	0.0000	0.0000	0.0028	2.00
	0.5236	0.5197	0.0039	0.0029	2.00
	0.9634	0.9625	0.0009	0.0028	2.00
	1.9763	1.9752	0.0011	0.0070	2.00
546.1	0.0000	-0.0001	0.0001	0.0028	2.00
	0.5191	0.5171	0.0020	0.0031	2.00
	1.0003	0.9984	0.0019	0.0033	2.00
	1.9987	1.9946	0.0041	0.0084	2.00
590	0.0000	0.0000	0.0000	0.0028	2.00
	0.5523	0.5509	0.0014	0.0030	2.00
	1.0809	1.0799	0.0010	0.0029	2.00
	2.0391	2.0329	0.0062	0.0080	2.00
635	0.0000	0.0000	0.0000	0.0028	2.00
	0.5601	0.5584	0.0017	0.0031	2.00
	1.0512	1.0498	0.0014	0.0029	2.00
	1.9294	1.9265	0.0029	0.0082	2.00

**เอกสารไม่ควบคุม**

FM-708-02 R01 1/11/2021

## REPORT OF CALIBRATION

Certificate No. : SP22-016

Page 4 of 5

Photometric Accuracy :

Wavelength (nm.)	CRMs Values (Abs)	UUC Reading (Abs)	Correction (Abs)	Uncertainty (Abs)	Coverage factor <i>k</i>
235	0.0000 0.7478	0.0001 0.7421	-0.0001 0.0057	0.0050 0.0056	2.00 2.00
257	0.0000 0.8686	0.0000 0.8619	0.0000 0.0067	0.0050 0.0059	2.00 2.00
313	0.0000 0.2912	0.0000 0.2896	0.0000 0.0016	0.0050 0.0051	2.00 2.00
350	0.0000 0.6448	0.0000 0.6403	0.0000 0.0045	0.0050 0.0055	2.00 2.00

## REPORT OF CALIBRATION

Certificate No. : SP22-016

Page 5 of 5

Wavelength Accuracy :

CRMs Values (nm.)	UUC Reading (nm.)	Correction (nm.)	Uncertainty (nm.)	Coverage factor <i>k</i>
241.72 279.45 287.81 334.06 360.93 418.59 445.94 453.66 460.02 536.59 637.98	242.0 279.5 287.5 333.5 360.5 418.0 445.4 453.2 459.7 536.2 638.3	-0.28 -0.05 0.31 0.56 0.43 0.59 0.54 0.46 0.32 0.39 -0.32	0.18 0.18 0.18 0.18 0.18 0.18 0.18 0.18 0.18 0.18 0.18	2.00 2.00 2.00 2.00 2.00 2.00 2.00 2.00 2.00 2.00 2.00
431.38 472.50 513.47 528.88 573.17 585.35 684.40 740.72 748.55 807.03 879.28	431.0 472.5 513.5 528.5 573.0 585.0 684.7 740.8 748.5 807.3 879.0	0.38 0.00 -0.03 0.38 0.17 0.35 -0.30 -0.08 0.05 -0.27 0.28	0.18 0.18 0.18 0.18 0.18 0.20 0.18 0.20 0.18 0.18 0.18	2.00 2.00 2.00 2.00 2.00 2.00 2.00 2.00 2.00 2.00 2.00

Remark : - UUC = Unit Under Calibration

- N/A - Not Available

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

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

- \* Indicates non TISI accredited

- End of Certificate -

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เอกสารไม่ควบคุม







REPORT OF CALIBRATION

Certificate No. : SP22-007

Page 3 of 5

Calibration Results : Without adjustment

Photometric Accuracy :

Wavelength (nm.)	CRMs Values (Abs)	UUC Reading (Abs)	Correction (Abs)	Uncertainty (Abs)	Coverage factor <i>k</i>
420	0.0000	0.000	0.0000	0.0028	2.00
	0.5787	0.577	0.0017	0.0031	2.00
	1.0490	1.050	-0.0010	0.0029	2.00
	2.1900	2.183	0.0070	0.0080	2.00
440	0.0000	0.000	0.0000	0.0028	2.00
	0.5607	0.560	0.0007	0.0034	2.00
	1.0247	1.023	0.0017	0.0035	2.00
	2.1229	2.118	0.0049	0.0079	2.00
465	0.0000	0.000	0.0000	0.0028	2.00
	0.5236	0.521	0.0026	0.0030	2.00
	0.9634	0.963	0.0004	0.0029	2.00
	1.9763	1.974	0.0023	0.0070	2.00
546.1	0.0000	0.000	0.0000	0.0028	2.00
	0.5191	0.518	0.0011	0.0031	2.00
	1.0003	1.000	0.0003	0.0033	2.00
	1.9987	1.996	0.0027	0.0084	2.00
590	0.0000	0.000	0.0000	0.0028	2.00
	0.5523	0.552	0.0003	0.0030	2.00
	1.0809	1.082	-0.0011	0.0030	2.00
	2.0391	2.033	0.0061	0.0079	2.00
635	0.0000	0.000	0.0000	0.0028	2.00
	0.5601	0.562	-0.0019	0.0031	2.00
	1.0512	1.052	-0.0008	0.0030	2.00
	1.9294	1.925	0.0044	0.0079	2.00

REPORT OF CALIBRATION

Certificate No. : SP22-007

Page 4 of 5

Photometric Accuracy :

Wavelength (nm.)	CRMs Values (Abs)	UUC Reading (Abs)	Correction (Abs)	Uncertainty (Abs)	Coverage factor <i>k</i>
235	0.0000	0.000	0.0000	0.0050	2.00
	0.7478	0.746	0.0018	0.0057	2.00
257	0.0000	0.000	0.0000	0.0050	2.00
	0.8686	0.861	0.0076	0.0059	2.00
313	0.0000	0.000	0.0000	0.0050	2.00
	0.2912	0.291	0.0002	0.0051	2.00
350	0.0000	0.000	0.0000	0.0050	2.00
	0.6448	0.638	0.0068	0.0055	2.00

## REPORT OF CALIBRATION

Certificate No. : SP22-007

Page 5 of 5

### Wavelength Accuracy :

CRMs Values (nm.)	UUC Reading (nm.)	Correction (nm.)	Uncertainty (nm.)	Coverage factor $k$
241.54	240.8	0.74	0.18	2.00
279.40	278.5	0.90	0.18	2.00
288.70	288.0	0.70	0.18	2.00
334.22	333.5	0.72	0.18	2.00
361.26	360.5	0.76	0.18	2.00
418.48	418.0	0.48	0.18	2.00
446.70	446.0	0.70	0.18	2.00
453.20	453.0	0.20	0.18	2.00
460.06	459.5	0.56	0.18	2.00
536.90	536.0	0.90	0.18	2.00
637.94	637.2	0.74	0.18	2.00
440.74	440.0	0.74	0.18	2.00
472.22	471.6	0.62	0.18	2.00
513.70	513.0	0.70	0.18	2.00
528.72	528.0	0.72	0.18	2.00
574.60	573.8	0.80	0.18	2.00
585.48	584.6	0.88	0.20	2.00
684.63	684.0	0.63	0.18	2.00
740.27	739.8	0.47	0.20	2.00
748.28	747.8	0.48	0.18	2.00
807.16	806.4	0.76	0.18	2.00
879.70	878.8	0.90	0.18	2.00

Remark : - UUC = Unit Under Calibration

- N/A = Not Available

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

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

- \* Indicates non TISI accredited

- End of Certificate -

## CERTIFICATE OF CALIBRATION

Certificate No. : SP22-008

Page 1 of 5

Customer : United Analyst and Engineering Consultant Co.,Ltd. (Head Office)

Address : 3 Soi Udomsuk 41, Sukhumvit Road, Bangehak, Phrakhanong,

Bangkok 10260

Location of calibration : Laboratory 213

Equipment : UV-Vis Spectrophotometer

Manufacturer : Hitachi

Model : U-2900

Serial No. : 21E22-009


ID No. : UAE.WAT.051/2564

Received Date : 20 January 2022

Calibration Date : 20 January 2022

Issue Date : 24 January 2022

Condition Instrument : Good

Calibrated by : 

Approved by : 

(Mr. Tanavut Rittidach)

(Ms. Chonhicha Sangngern)

Technical Manager

Quality Manager

The calibration result is applied only to the above calibrated item and was found accurate as shown on date and place of calibration only.

The measurement capability of the laboratory and its traceability to recognized national standards and to the unit 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 DQE Services Co., Ltd.

REPORT OF CALIBRATION

Certificate No. : SP22-008

Page 2 of 5

Environment Condition : Ambient Temperature 25 ± 5 °C

Relative humidity 55 ± 20 %RH

Calibration method : In-house method CP-01 Based on ASTM E275-08

Certified Reference Materials :

Material	Serial No.	Certificate No.	Due date
Absorbance Standard set	25760	95935	22 October 2023
Absorbance Standard set	25757	95929	22 October 2023
Wavelength Standard set	25806	95916	22 October 2023
Wavelength Standard set	25758	95915	22 October 2023

Traceability This certification is traceable to the International System of Unit maintained at National -

Institute of Standards and Technology (NIST) through Starna Scientific Limited

Spectral Band Width of UUC : 1.5 nm.

Scan Speed of UUC : 200 nm/min

Scan Interval of UUC : 0.1 nm.

Resolution of UUC : Photometric 0.001 Abs.

Wavelength 0.1 nm.

REPORT OF CALIBRATION

Certificate No. : SP22-008

Page 3 of 5

Calibration Results : Without adjustment

Photometric Accuracy :

Wavelength (nm.)	CRMs Values (Abs)	UUC Reading (Abs)	Correction (Abs)	Uncertainty (Abs)	Coverage factor k
420	0.0000	0.000	0.0000	0.0028	2.00
	0.5787	0.576	0.0027	0.0031	2.00
	1.0490	1.046	0.0030	0.0029	2.00
	2.1900	2.182	0.0080	0.0075	2.00
440	0.0000	0.000	0.0000	0.0028	2.00
	0.5607	0.559	0.0017	0.0034	2.00
	1.0247	1.023	0.0017	0.0035	2.00
	2.1229	2.116	0.0069	0.0079	2.00
465	0.0000	0.000	0.0000	0.0028	2.00
	0.5236	0.521	0.0026	0.0030	2.00
	0.9634	0.962	0.0014	0.0029	2.00
	1.9763	1.970	0.0063	0.0070	2.00
546.1	0.0000	0.000	0.0000	0.0028	2.00
	0.5191	0.519	0.0001	0.0031	2.00
	1.0003	0.999	0.0013	0.0033	2.00
	1.9987	1.992	0.0067	0.0084	2.00
590	0.0000	0.000	0.0000	0.0028	2.00
	0.5523	0.552	0.0003	0.0030	2.00
	1.0809	1.080	0.0009	0.0030	2.00
	2.0391	2.031	0.0081	0.0079	2.00
635	0.0000	0.000	0.0000	0.0028	2.00
	0.5601	0.560	0.0001	0.0031	2.00
	1.0512	1.052	-0.0008	0.0030	2.00
	1.9294	1.922	0.0074	0.0079	2.00

REPORT OF CALIBRATION

Certificate No. :SP22-008

Page 4 of 5

Photometric Accuracy :

Wavelength (nm.)	CRMs Values (Abs)	UUC Reading (Abs)	Correction (Abs)	Uncertainty (Abs)	Coverage factor k
235	0.0000	0.000	0.0000	0.0050	2.00
	0.7478	0.747	0.0008	0.0057	2.00
257	0.0000	0.000	0.0000	0.0050	2.00
	0.8686	0.865	0.0036	0.0059	2.00
313	0.0000	0.000	0.0000	0.0050	2.00
	0.2912	0.290	0.0012	0.0051	2.00
350	0.0000	0.000	0.0000	0.0050	2.00
	0.6448	0.640	0.0048	0.0055	2.00

REPORT OF CALIBRATION

Certificate No. :SP22-008

Page 5 of 5

Wavelength Accuracy :

CRMs Values (nm.)	UUC Reading (nm.)	Correction (nm.)	Uncertainty (nm.)	Coverage factor k
241.72	241.0	0.72	0.18	2.00
279.45	279.0	0.45	0.18	2.00
287.81	287.0	0.81	0.18	2.00
334.06	333.5	0.56	0.18	2.00
360.93	360.0	0.93	0.18	2.00
418.59	418.0	0.59	0.18	2.00
445.94	445.5	0.44	0.18	2.00
453.66	453.0	0.66	0.18	2.00
460.02	459.5	0.52	0.18	2.00
536.59	536.0	0.59	0.18	2.00
637.98	637.5	0.48	0.18	2.00
431.38	431.0	0.38	0.18	2.00
472.50	472.0	0.50	0.18	2.00
513.47	513.0	0.47	0.18	2.00
528.88	528.5	0.38	0.18	2.00
573.17	573.0	0.17	0.18	2.00
585.35	585.0	0.35	0.20	2.00
684.40	684.0	0.40	0.18	2.00
740.72	740.5	0.22	0.20	2.00
748.55	748.5	0.05	0.18	2.00
807.03	807.0	0.03	0.18	2.00
879.28	879.5	-0.22	0.18	2.00

Remark : - UUC = Unit Under Calibration

- N/A = Not Available

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

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

- \* Indicates non TISI accredited

- End of Certificate -



FOSS

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

## Customer Service Report

Report No: 5874

Date: 30/11/21

Customer: UAE

Instrument: KT 200

Address: 91 7.002021 wthos 2740W 00210

Serial: 91790529

Hours Start 8.00  
Finish 9.00Labour 9.00  
Travel To Customer 8.00  
Travel From Customer 14.00  
18.00

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: FOSS complete Pro Contract No. If applicable

Details of Work / Test		Condition / Status	
- Check instrument		OK	
- Check PM kit for KT 200		Pass	
- Safety Valve		Pass	
- Rubber Element		Pass	
- Heating Element		Pass	
- New panel PCB		Pass	
- Safety door		Pass	
- Clean & Lubricant		Pass	
- Check & reassembled		Pass	
- Check volume adjusted		Pass	
-		Pass	

Part No:	Batch	Description	Qty
10009965	11235-983	Foss PM kit KT 200	1
1575-0029	29.08.21	Safety Valve	1
1546-0125	06.11.21	Rubber Element for Heating	2
110035-12	02.08.21	Heating Element	1
100027-62	16.11.20	Seal	1
60094273	16.08.21	KT 200 new panel PCB	1
100006385	22.04.21	Safety door complete	1

I confirm this report is accurate and complete			
Signed FOSS		Signed Customer	
Name		Name	
Would you be willing to participate in a brief survey in order to tell us how we performed?			
		Email	

## FOSS Preventive Maintenance Protocol

FossCare™

Customer: UAE

Instrument	Kjeltec™ 2100 = Kjeltec 200
Recommended PM interval (whichever occurs first between interval and no. of samples analysed)	12 months
Preventive maintenance kit (P/N)	10009965

## Introduction

A maintenance protocol provides systematic and functional means of maintaining a specific instrument type. The recommended PM interval depends on the operational conditions and is based on our extensive experience and knowledge of manufacturing and maintaining analytical instruments.

Apart from sample throughput, the environmental conditions also need to be considered. A demanding environment, such as high ambient temperature, humidity, dirtiness etc can measurably shorten component lifetime and also the maintenance and component replacement intervals.

## NOTE!

The content of this protocol is subject to change over time. In order to safeguard that you obtain the correct parts, please make sure to indicate serial no and date of installation when contacting your FOSS representative.

Dedicated Analytical Solutions

FOSS Analytical A/S  
69 Slangerupgade  
DK-3400 Hillerød  
Denmark  
Tel: +45 7010 3370  
Fax: +45 7010 3371  
E-mail: support@foss.dk  
Web: www.foss.dkFOSS Analytical AB  
Box 70  
SE-263 21 Höganas  
Sweden  
Tel: +46 42 361500  
Fax: +46 42 340349  
E-mail: support@foss.dk  
Web: www.foss.dk

Customer Support, 1001 4572 / Rev. 3

1(2)

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## Maintenance Procedure

### Exchange of Parts and Cleaning

Step	Action	Part	P/N	OK
1	Replace	Adapter for dig. tube 250 ml	1000 0056	<input type="checkbox"/>
2	Replace	Non return valve	1000 3538	<input type="checkbox"/>
3	Replace valves in alkali pump	Valve kit reagent/water pump	1575 0093	<input type="checkbox"/>
4	Replace steam tubing	Silicone tubing 8/12 mm	1582 0006	<input type="checkbox"/>
5	Replace alkali tubing	Tubing reinforced for alkali	1582 0011	<input type="checkbox"/>
6	Replace water tubing	Tubing PVC 8/11 mm	1582 0004	<input type="checkbox"/>
7	Cleaning	Steam generator		<input type="checkbox"/>
8	Cleaning	Splash head		<input type="checkbox"/>

### Check and Adjustments

Step	Action	Module	Measured	Limits	OK
1	Check alkali volume, 10 ml/stroke	Alkali pump	๙๘	At 50 ml -0/+3 ml	<input checked="" type="checkbox"/>
2	Check distillation volume		120ml	100 – 150 ml/4 min	<input checked="" type="checkbox"/>
3	Check front panel switches				<input checked="" type="checkbox"/>
4	Check cables and electrical connections				<input checked="" type="checkbox"/>
5	Check level pins in steam generator				<input checked="" type="checkbox"/>
6	Check safety door switch				<input checked="" type="checkbox"/>



TECHNOLOGY PROMOTION ASSOCIATION (THAILAND-JAPAN)  
CORPORATE SERVICES 3: EQUIPMENT CALIBRATION AND TESTING SERVICES  
534/4 PATTANAKARN ROAD SOI 18, SUANLUANG, SUANLUANG BANGKOK 10250  
TEL. 0-2717-3000-27 FAX. 0-2719-9484



Cert. No.: 22TM671  
Page.: 1 of 3

## Certificate of Calibration

**Equipment :** Incubator  
**Manufacturer :** Memmert  
**Model :** IN 75  
**Serial No. :** D317.0307  
**ID No. :** UAE.MIC.023/2561  
**Submitted by :** United Analyst and Engineering Consultant Co.,Ltd.  
3 Soi Udomsuk 41, Sukhumvit Road,  
Bangchak, Phrakhanong,  
Bangkok 10260  
**Location :** Microbiology Laboratory (302)  
**Received Order :** 3 May 2022  
**Calibration Date :** 3 May 2022  
**Ambient Temperature :** (26 ± 10 ) °C  
**Relative Humidity :** (50 ± 30 ) %  
**Calibrated by :** Preecha Hlahib

**Approved by :**   
Approved Signatory

( ) Porthippa Tameyakul  
( ) Malee Buikruea  
( ) Suwit Imjai

**Issue Date :** 10 May 2022

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





Cert. No.: 22TM671

Condition As-Received : Used Item

Reference : 2205-00030C-2

**Result of Calibration :-**

Function of UUC\* : Temperature Source

Fresh air setting : Close

Calibration	IIIIC*	IIIIC*	T
-------------	--------	--------	---

Point	Setting	Reading
	000	000
	000	000
	000	000

- | செயல்பாடு            | வெளியேற்றம் | உள்வெளியேற்றம் | மொத்த வெளியேற்றம் |
|----------------------|-------------|----------------|-------------------|
| 1. உள்வெளியேற்றம்    | ( 00 )      | ( 00 )         | ( 00 )            |
| 2. வெளியேற்றம்       | ( 00 )      | ( 00 )         | ( 00 )            |
| 3. மொத்த வெளியேற்றம் | ( 00 )      | ( 00 )         | ( 00 )            |

	(0)	(0)	(0)
260	260	260	260

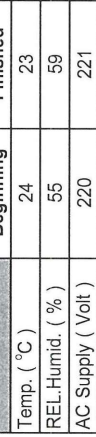
20 Jul 2022

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

**Result of Calibration :-**

36.0	36.031	36.035	36.0
------	--------	--------	------

**Average\* :** The average of 30 values in e



Probe Installation Details :  
Dimension of Chamber :

$a =$	5.0	cm	$D =$	0.32	m
-------	-----	----	-------	------	---

$$b = 5.0 \text{ cm} \quad W = 0.42 \text{ m}$$

$c = 5.0 \text{ cm}$        $H = 0.56 \text{ m}$

Capacity = 0.075 m<sup>3</sup>

Position :	Ref. Std. ID No.:
1	19-15RTD-01
2	19-15RTD-02
3	19-15RTD-03
4	19-15RTD-04
5	19-15RTD-05
6	21-15RTD-06
7	19-15RTD-07
8	19-15RTD-08
9 (ref.)	19-15RTD-09

**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  
534/4 PATTANAKARN ROAD SOI 18, SUANLUANG, SUANLUANG BANGKOK 10250  
TEL. 0-2717-3000-27 FAX. 0-2719-9484



Cert. No.: 21TM1357  
Page.: 1 of 3

## Certificate of Calibration

**Equipment :** Incubator  
**Manufacturer :** Memmert  
**Model :** INB 400  
**Serial No. :** E411.1325  
**ID No. :** UAE.MIC.003/2555  
**Submitted by :** United Analyst and Engineering Consultant Co.,Ltd.  
3 Soi Udomsuk 41, Sukhumvit Road,  
Bangchak, Phra Khanong,  
Bangkok 10260  
**Location :** Microbiology Laboratory  
**Received Order :** 14 July 2021  
**Calibration Date :** 14 July 2021  
**Ambient Temperature :** ( 26 ± 10 ) °C  
**Relative Humidity :** ( 50 ± 30 ) %  
**Calibrated by :** Preecha Hiahib

**Approved by :**   
Approved Signatory

( ) Porthippa Tameyakul  
( ☒ ) Malee Butkruea  
( ) Suwit Imjai

**Issue Date :** 20 July 2021

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 0030500



**Equipment :** Incubator  
**Condition As-Received :** Used Item  
**Reference :** 2107-0318OC-3  
**Result of Calibration :-** ( \* ) Without Adjustment  
**Function of UUC\* :** Temperature Source

Cert. No.: 21TM1357  
Page.: 3 of 3

Calibration Point ( °C )	UUC* Setting ( °C )	UUC* Reading ( °C )	Temperature stability ( ± °C )	Temperature uniformity ( °C )	Overall Variation ( °C )	Uncertainty ( ± °C )	Coverage Factor <i>k</i>		
36.0	35.0	35.0	0.052	0.49	0.90	0.30	2		
Measured Temperature ( °C )									
Calibration Point ( °C )	Position								
	1	2	3	4	5	6	7	8	9 (ref.)
36.0	36.328	36.158	36.107	36.151	35.718	35.876	35.494	35.852	35.882

**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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a 106477





**Equipment :** Incubator  
**Condition As-Received :** Used Item  
**Reference :** 2107-03180C-3

**Cert. No.:** 21TM1357  
**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 MY57013823 21LM3 26 Feb 2022

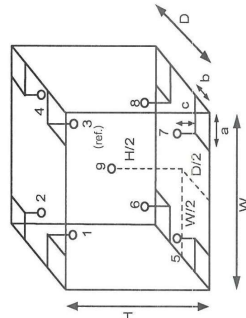
2. This certificate is valid only to the item calibrated on date and place of calibration.

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 = 5.0 cm  
b = 5.0 cm  
c = 5.0 cm  
D = 0.40 m  
W = 0.33 m  
H = 0.40 m  
Capacity = 0.053 m<sup>3</sup>

Position :	Ref. Std. ID No.:
1	21-17RTD-01
2	21-17RTD-02
3	17RTD-03
4	17RTD-04
5	17RTD-05
6	17RTD-06
7	17RTD-07
8	17RTD-08
9 (ref.)	17RTD-09

Environment during calibration		
	Beginning	Finished
Temp. ( °C )	25	25
REL.Humid. ( % )	54	60
AC Supply ( Volt )	220	221



**TECHNOLOGY PROMOTION ASSOCIATION (THAILAND-JAPAN)**  
**CORPORATE SERVICES 3: EQUIPMENT CALIBRATION AND TESTING SERVICES**  
534/4 PATTANAKARN ROAD SOI 18, SUANLUANG, SUANLUANG BANGKOK 10250  
TEL. 0-2717-3000-27 FAX. 0-2719-9484



**Cert. No.:** 22TM332  
**Page.:** 1 of 3

## Certificate of Calibration

**Equipment :** Water Bath  
**Manufacturer :** Memmert  
**Model :** WNE 14  
**Serial No. :** L416.0614  
**ID No. :** UAE.MIC.020/2561  
**Submitted by :** United Analyst and Engineering Consultant Co.,Ltd.  
3 Soi Udomsuk 41, Sukhumvit Road,  
Bangchak, Phrakhanong,  
Bangkok 10260  
**Location :** Microbiology Laboratory  
**Received Order :** 17 February 2022  
**Calibration Date :** 17 February 2022  
**Ambient Temperature :** ( 26 ± 10 ) °C  
**Relative Humidity :** ( 50 ± 30 ) %  
**Calibrated by :** Suwit Imjai  
**Approved by :**  Approved Signatory  
( ) Ponthippa Tameyakul  
(  ) Malee Butkruea

**Issue Date :** 22 February 2022

**The Uncertainties are for a confidence probability of approximately 95 %**

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**เอกสารไม่ควบคุม**  
a 1064478

**เอกสารไม่ควบคุม**  
A 0038096



Equipment : Water Bath  
Condition As-Received : Used Item  
Reference : 2202-0444OC-5  
Cert. No.: 22TM332  
Page.: 2 of 3

**Procedure Used :-**

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

The temperature scale used was based on ITS-90.

**Condition of this result of calibration**

1. Reference standard instrument:-

Instrument	Model	Serial No.	Cert. No.	Due Date
1 ) Data Acquisition	34970A	MY44067817	21LM10	20 Jul 2022

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

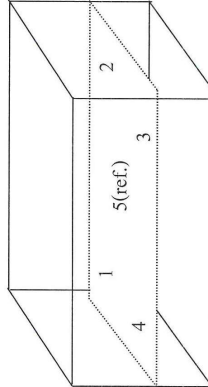
3. This certification is traceable to the International System of Unit.

**Result of Calibration :-**

( \* ) Without Adjustment

Function of UUC\* : Temperature Source

	Environmental		AC Voltage Supply ( Volt )
	( °C )	( %R.H. )	
Beginning of Calibration	21	65	229
Finished of Calibration	22	56	230



Front

Position :	Ref. Std. ID No.:
1	70RC143
2	70RC144
3	70RC145
4	70RC146
5(ref.)	70RC147



Equipment : Water Bath  
Condition As-Received : Used Item  
Reference : 2202-0444OC-5  
Cert. No.: 22TM332  
Page.: 3 of 3  
Result of Calibration :- ( \* ) Without Adjustment  
Function of UUC\* : Temperature Source

Calibration point ( °C )	UUC* Setting ( °C )	UUC* Reading ( °C )	Average* Standard Reading ( °C )				
			1	2	3	4	5 (ref.)
44.5	44.5	44.5	44.546	44.517	44.513	44.537	44.578
50.0	50.0	50.0	50.089	50.051	50.036	50.061	50.092

Calibration point ( °C )	Uniformity ( °C )	Stability ( ± °C )	Uncertainty ( ± °C )	Coverage Factor <i>k</i>
44.5	0.10	0.043	0.15	2
50.0	0.11	0.042	0.15	2

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

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

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

**UUC\* :** Unit Under Calibration

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

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

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NSC-TISI-TISI7025  
CALIBRATION 0008

Cert. No.: 21TM1355/1  
Page.: 1 of 3

## Certificate of Calibration

This Certificate was issued to replace to the Certificate No. 21TM1355  
Equipment : Water Bath

Manufacturer : Memmert

Model : WB 14

Serial No. : I401.0569

ID No. : UAE.MIC.004/2544

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

Location : Microbiology Laboratory

Received Order : 14 July 2021

Calibration Date : 14 July 2021

Ambient Temperature : ( 26 ± 10 ) °C

Relative Humidity : ( 50 ± 30 ) %

Calibrated by : Preecha Hiahib

Approved by :

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

Approved Signatory

Issue Date :

30 July 2021

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

A 0030834



Equipment : Water Bath

Condition As-Received : Used Item

Reference : 2107-0318OC-5

Procedure Used :-

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

The temperature scale used was based on ITS-90.

Condition of this result of calibration

1. Reference standard instrument:-

Instrument Model Serial No. Cert. No. Due Date  
1 ) Data Acquisition 34972A MY57013823 21LM3 26 Feb 2022

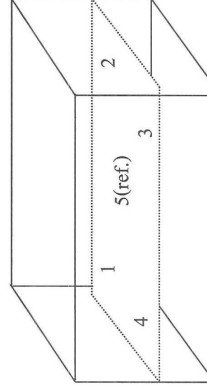
2. This certificate is valid only to the item calibrated on date and place of calibration.

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

Result of Calibration :- ( \* ) Without Adjustment

Function of UUC\* : Temperature Source

	Environmental		AC Voltage Supply
	( °C )	( %R.H. )	( Volt )
Beginning of Calibration	25	54	220
Finished of Calibration	25	57	222



Front

Position :	Ref. Std. S/N.:
1	4804539-006
2	4804539-007
3	4804539-008
4	4804539-009
5(ref.)	4804539-010

Cert. No.: 21TM1355/1  
Page.: 2 of 3

เอกสารไม่ควบคุม

เอกสารไม่ควบคุม

A 1065656





Equipment : Water Bath  
Condition As-Received : Used Item  
Reference : 2107-0318OC-5  
Result of Calibration :- ( \* ) Without Adjustment  
Function of UUC\* : Temperature Source

Cert. No.: 21TM1355/1  
Page.: 3 of 3

Calibration point ( °C )	UUC* Setting ( °C )	UUC* Reading ( °C )	Average* Standard Reading ( °C )				
			1	2	3	4	5 (ref.)
41.5	41.2	41.2	41.418	41.379	41.374	41.447	41.420

Calibration point ( °C )	Uniformity ( °C )	Stability ( ± °C )	Uncertainty ( ± °C )	Coverage Factor k
41.5	0.084	0.043	0.15	2

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

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

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

**UUC\*** : Unit Under Calibration

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

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

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TEL. 0-2717-3000-27 FAX. 0-2719-9484



NSC-TS-17517025  
CALIBRATION 0000

Cert. No.: 22TM89  
Page.: 1 of 3

## Certificate of Calibration

**Equipment :** Autoclave  
**Manufacturer :** ALP  
**Model :** CL-40L  
**Serial No. :** 802664  
**ID No. :** UAE.MIC.014/2550  
**Submitted by :** United Analyst and Engineering Consultant Co.,Ltd.  
3 Soi Udomsuk 41, Sukhumvit Road,  
Bangchak, Phrakhanong,  
Bangkok 10260  
**Location :** Air Analysis Unit  
**Received Order :** 17 February 2022  
**Calibration Date :** 17 February 2022  
**Ambient Temperature :** ( 26 ± 10 ) °C  
**Relative Humidity :** ( 50 ± 30 ) %  
**Calibrated by :** Kunchit Promprat  
**Approved by :**  Approved Signatory

( / ) Ponthippa Tameyakul  
( ✓ ) Malee Butkruea  
( ) Suwit Imjai

**Issue Date :** 22 February 2022

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

๑ 1065655

เอกสารไม่ควบคุม

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Equipment : Autoclave  
Condition As-Received : Used Item  
Reference : 2202-0444OC-1  
Procedure Used :-

Cert. No.: 22TM89  
Page.: 2 of 3

Calibration were conducted using in-house calibration procedure CP-QT03 according to direct measurement method with Data Acquisition which connected with Thermocouple Type T  
The temperature scale used was based on ITS-90.

**Condition of this result of calibration**

1. Reference standard instrument:-
- | Instrument           | Model  | Serial No. | Cert. No. | Due Date    |
|----------------------|--------|------------|-----------|-------------|
| 1 ) Data Acquisition | 34970A | MY44035217 | 21LM30    | 23 Dec 2022 |
2. This certificate is valid only to the item calibrated on date and place of calibration.
3. This certification is traceable to the International System of Unit.
4. This result of calibration covers laboratory autoclaves for the sterilization of goods and material which could be infected with organisms categorized as Hazard Group 1, 2 and 3\*\*

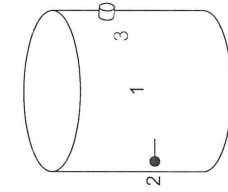
(\*\* = Categorization of pathogens according to hazard and categories of containment, second edition, 1990 )  
It does not cover autoclaves for use with material infect with organisms in Hazard Group 4, for which complete containment and sterilization of infected condensate is considered to be essential.

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

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

**Function of UUC\* :**

Temperature Source



	Environmental		
	( °C )	( %R.H. )	( Volt )
Beginning of Calibration	27	68	226
Finished of Calibration	27	65	226

Position	Description	Ref. Std. ID No.:
1 =	Center of chamber	22-10TC-01
2 =	Temperature sensor	22-10TC-02
3 =	Exhaust port	22-10TC-03



Equipment : Autoclave  
Condition As-Received : Used Item  
Reference : 2202-0444OC-1  
Result of Calibration :- ( \* ) Without Adjustment

Cert. No.: 22TM89  
Page.: 3 of 3

Operating parameter Set : Temperature = 122 °C  
Sterilization period = 30 minute

UUC* Setting ( °C )	UUC* Reading ( °C )	Position	Average* Standard Reading ( °C )	Stability ( ± °C )	Pressure Reading ( MPa )	Uncertainty ( ± °C )	Coverage Factor k
122	122	1	122.373	0.32	0.12	1.2	2
		2	122.421				
		3	122.292				

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

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

**UUC\* :** Unit Under Calibration

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

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

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