

ภาคผนวก ค  
เอกสารสอบเทียบเครื่องมือ

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แผนการติดตามตรวจสอบคุณภาพสิ่งแวดล้อม ระยะดำเนินการ ประจำปี พ.ศ. 2565

โครงการอาคารสำนักงานไทยอยล์ศรีราชา

บริษัท ไทยอยล์ จำกัด (มหาชน)

### รายการใบรับรองสอบเทียบเครื่องมือหลักประจำห้องปฏิบัติการสำหรับวิเคราะห์คุณภาพสิ่งแวดล้อม

No.	Instrument/Equipment	Parameter	Manufacturer	Model/Serial No.	Calibrator	Certification No.	Date of Calibration	Due date of Calibration*	Remark
เครื่องมือสำหรับวิเคราะห์คุณภาพน้ำ									
1	pH Meter	ความเป็นกรดและด่าง (pH)	Hanna Instrument	HI2020-02 / C0051107	National Food Institute, Ministry of Industry, Thailand	2103272-001-02	14 Jun 21	13 Jun 22	-
2	pH Meter		Mettler-Toledo	SevenCompact S220/ C113432421	National Food Institute, Ministry of Industry, Thailand	2103189-001-01	14 Jun 21	13 Jun 22	-
3	BOD Incubator	บีโอดี (BOD)	Arco	UC4-1320 / (UAE.LAB002/2550)	Technology Promotion Association (Thailand-Japan)	21TM1405	17 Aug 21	16 Aug 22	-
3	BOD Incubator		Arco	UC4-1320 / (UAE.WAO.018/2559)	Technology Promotion Association (Thailand-Japan)	21TM1406	17 Aug 21	16 Aug 22	-
5	Analytical Balance (Readability 0.01 mg)	สารแขวนลอย (Suspended 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	สารที่ละลายได้ทั้งหมด (Total Dissolved Solid)	Memmert	UF55 / B216.1666	Technology Promotion Association (Thailand-Japan)	21TM1876	29 Oct 21	28 Oct 22	-
7	Hot Air Oven		Memmert	UF55 / B212.0411	Technology Promotion Association (Thailand-Japan)	22TM304	7 Apr 22	6 Apr 23	-
8	Analytical Balance (Repeatability 0.1 mg)	น้ำมันและไขมัน (Oil & Grease)	Mettler-Toledo	AB-204S/FACT / 1129361010	National Food Institute, Ministry of Industry, Thailand	2103270-001-01	11 Jun 21	10 Jun 22	-
9	Incubator (Cooled Incubator)	แบคทีเรียกลุ่มโคลิฟอร์มทั้งหมด (Total Coliform Bacteria)	Binder	BD 53 / 13-07343	Technology Promotion Association (Thailand-Japan)	22TM335	17 Feb 22	16 Feb 23	-
10	Incubator (Cooled Incubator)	แบคทีเรียกลุ่มฟิคอลโคลิฟอร์ม (Fecal Coliform Bacteria)	Memmert	INB400 / E411.1325	Technology Promotion Association (Thailand-Japan)	21TM1357	14 Jul 21	13 Jul 22	-
11	Incubator	เอสเชอริเชียโคไล, คลอสตริเดียม, สตาฟีโลค็อกคัสออเรียส, ลิสทีโอเนลลา	Memmert	BE400 / e402.1032	Technology Promotion Association (Thailand-Japan)	21TM1358	15 Jul 21	14 Jul 22	-

รายการใบรับรองสอบเทียบเครื่องมือหลักประจำห้องปฏิบัติการสำหรับวิเคราะห์คุณภาพสิ่งแวดล้อม

No.	Instrument/Equipment	Parameter	Manufacturer	Model/Serial No.	Calibrator	Certification No.	Date of Calibration	Due date of Calibration*	Remark
เครื่องมือสำหรับวิเคราะห์คุณภาพน้ำ									
12	Incubator	แบคทีเรียกลุ่มโคลิฟอร์มทั้งหมด (Total Coliform Bacteria)	Memmert	IPP 260 / V616.0066	Technology Promotion Association (Thailand-Japan)	22TM672	5 May 22	4 May 23	
13	Incubator	แบคทีเรียกลุ่มฟีคอลโคลิฟอร์ม (Fecal Coliform Bacteria)	Memmert	IPP 260 / V615.0187	Technology Promotion Association (Thailand-Japan)	22TM563	7 Apr 22	6 Apr 23	-
14	Water Bath	เอสเซอร์เซียโคไล สตาฟีโลค็อกคัสออเรียส	Memmert	WB 14 / I401.0569	Technology Promotion Association (Thailand-Japan)	21TM1355/1	14 Jul 21	13 Jul 22	-
15	Water Bath	คลอสตริเดียม, ลิสทีโอเนลลา	Memmert	WNB 14 / L407.0756	Technology Promotion Association (Thailand-Japan)	21TM1356	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	-
17	Auto Clave		ALP	CL-40L / 807298	Technology Promotion Association (Thailand-Japan)	21TM831	7 May 21	6 May 22	-
18	Digestor Unit	ทีเคเอ็น (TKN)	FOSS TECATOR	2520auto / 91794469	National Food Institute, Ministry of Industry, Thailand	2202361-001-01	4 Apr 22	3 Apr 23	-
19	Digestor Unit		Velp	DKL20 / 213517	National Food Institute, Ministry of Industry, Thailand	2103014-001-02	7 Jun 21	6 Jun 22	-
20	Distillation Unit (Kjeldahl Method)		FOSS TECATOR	KT200 / 91790524	FOSS South East Asia	30 Jan 16	30 Nov 21	29 Nov 22	-

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


## Calibration Certificate

**Substitute for Certificate No.:** 2103272-001-01  
**Certificate No.:** 2103272-001-02  
**Client name:** UNITED ANALYST AND ENGINEERING CONSULTANT CO.,LTD.  
**Address:** 3 Soi Udomsuk 41, Sukhumvit Road,  
Bangchack, Prakhong, Bangkok 10260

Page 1 of 5

**Equipment:** pH Meter  
**Manufacturer:** HANNA INSTRUMENTS  
**Model:** HI2020-02  
**Serial No.:** C0051107  
**ID No.:** UAE.WAO.005/2557  
**Order No.:** 2103272  
**Operation No.:** 2103272-001  
**Date of Receipt:** 11 June 2021  
**Date of Calibration:** 14 June 2021

**Calibrated by** Mr.Manas Somsak  
Expert

**Approved by**   
( Mr.Pheraphat Tuanjit )

Manager, Division of Calibration Laboratory

**Date of Issue:** 2 July 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.:** 2103272-001-02  
**Equipment:** pH Meter  
**Resolution:** 0.01 pH ; 0.1 mV  
**Manufacturer:** HANNA INSTRUMENTS  
**Model:** HI2020-02  
**Serial No.:** C0051107  
**Type:** Bench top  
**ID No.:** UAE.WAO.005/2557

**Date of Calibration:** 14 June 2021

Page 2 of 5

**Location:** Chemical Calibration Laboratory, National Food Institute  
**Environment Condition:** **Ambient Temperature:** ( 23.7 ± 1.5 ) °C **Relative Humidity:** ( 53.5 ± 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	SCL-20F-0682	17 June 2021
2.2 Digital Thermometer	2709007	Fluke	CC 630609-01	30 October 2021
2.3 Thermo-Hygro Meter	NFI.BTH003/17	PONPE	QR20-1578	21 September 2021

Certified Reference Material	Lot. No.	Manufacturer	Ref N	Expire Date
2.4 pH buffer 4.008 (Primary pH buffer Solution)	710048	CPAchem	PH216.L5	2 October 2022
2.5 pH buffer 6.865 (Primary pH buffer Solution)	710049	CPAchem	PH217.L5	2 October 2022
2.6 pH buffer 10.01 (Primary pH buffer Solution)	710050	CPAchem	PH220.L5	2 October 2022
2.7 pH buffer 7.00 (Standard pH buffer Solution)	710051	CPAchem	PH107.L5	2 October 2021

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

3.1 Instruments No.2.1	through	NSC-TISI-TIS 17025 Laboratory Accreditation of Calibration No.0075
3.2 Instruments No.2.2	through	NSC-TISI-TIS 17025 Laboratory Accreditation of Calibration No.0061
3.3 Instruments No.2.3	through	NSC-TISI-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 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 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.



## Calibration Report

Certificate No.: 2103272-001-02

Equipment:

pH Meter

Resolution: 0.01 pH ; 0.1 mV

Manufacturer: HANNA INSTRUMENTS

Model: HI2020-02

Serial No.: C0051107

Type: Bench top

ID No.: UAE.WAO.005/2557

Date of Calibration: 14 June 2021

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### Calibration Results:

#### 1. Calibration of pH Meter

( Manual Temperature Compensation at 25 °C )

Nominal pH	DC Voltage Standard ( mV )	Average Indicator Reading		Uncertainty ( ±mV )	Coverage Factor ( k )
		mV	pH		
0.00	414.118	415.7	0.00	0.063	2.00
2.00	295.811	297.3	2.00	0.063	2.00
4.00	177.461	179.0	4.00	0.063	2.00
6.00	59.160	60.7	6.00	0.063	2.00
7.00	0.000	1.5	7.00	0.063	2.00
8.00	-59.158	-57.7	8.00	0.063	2.00
10.00	-177.461	-176.0	10.00	0.063	2.00
12.00	-295.812	-294.4	12.00	0.063	2.00
14.00	-414.118	-412.4	14.00	0.063	2.00

#### 2. Calibration of pH Meter with Electrode

( Manual Temperature Compensation at 25 °C )

Equipment: pH Electrode

Type: Combined Electrode

Manufacturer: HANNA INSTRUMENTS

Model: HI11310

Serial No.: 078743

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	162.7	99.1	0.0071	2.00
6.866	6.87	-4.9		0.0075	2.00
6.866	6.87	-4.9	95.0	0.0075	2.00
10.008	10.01	-181.3		0.0093	2.00
6.985	7.00	-13.6	-	0.0093	2.00

## Calibration Report

Certificate No.:

2103272-001-02

Equipment:

Digital Thermometer with RTD (pH Meter)

Resolution: 0.1 °C

Model: SevenEasy pH

Serial No.: C0051107

ID No.: UAE.WAO.005/2557

Manufacturer: HANNA INSTRUMENTS

Date of Calibration:

14 June 2021

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Location:

Chemical Calibration Laboratory, National Food Institute

Environment Condition:

Ambient Temperature 24 °C ± 1 °C

Relative Humidity 54 % ± 2 %

### Condition of this results of Calibration:

- 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 640028-01	12-Dec-21	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

- 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
- Result of Calibration : ☒ Without adjustment ☐ After adjustment

*RH*

## Calibration Report

**Certificate No.:** 2103272-001-02

**Equipment:** Digital Thermometer with RTD (pH Meter)

**Resolution:** 0.1 °C **Model:** SevenEasy pH

**Serial No.:** C0051107 **ID No.:** UAE.WAO.005/2557

**Manufacturer:** HANNA INSTRUMENTS

**Date of Calibration:** 14 June 2021

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**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 100 mm.

- Description of probe, model : HI11310 S/N : 078743

Dimension of probe : Diameter 4 mm., Length 118 mm.,

Sheath material : Stainless Steel

UUC* Reading (°C)	Standard Temperature (°C)	Correction Value (°C)	Uncertainty ± (°C)
15.1	15.001	-0.1	0.13
25.1	24.999	-0.1	0.13
35.2	34.999	-0.2	0.13

Remark: Edited Model from edge to HI2020-02.

**Note**

- UUC\* : Unit Under Calibration

- NFI Laboratory is not accredited ISO/IEC 17025 for calibration. In the scope marked with \*\*

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 -----

## Calibration Certificate

**Certificate No.:** 2103189-001-01

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

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

Page 1 of 5

**Equipment:** pH Meter

**Manufacturer:** METTLER TOLEDO

**Model:** SevenCompact S220

**Serial No.:** C113432421

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

**Order No.:** 2103189

**Operation No.:** 2103189-001

**Date of Receipt:** 9 June 2021

**Date of Calibration:** 14 June 2021

**Calibrated by** Mr.Manas Somsak  
Expert

**Approved by**   
( Mr.Pheraphat Tuanjit )

Manager, Division of Calibration Laboratory

**Date of Issue:** 15 June 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.: 2103189-001-01

Equipment: pH Meter  
Resolution: 0.01 pH ; 0.1 mV  
Manufacturer: METTLER TOLEDO Model: SevenCompact S220  
Serial No.: C113432421 Type: Bench top  
ID No.: UAE.WAT.009/2564

Date of Calibration: 14 June 2021 Page 2 of 5

Location: Chemical Calibration Laboratory, National Food Institute

Environment Condition: Ambient Temperature: ( 23.7 ± 1.5 ) °C Relative Humidity: ( 53.5 ± 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	SCL-20F-0682	17 June 2021
2.2 Digital Thermometer	2709007	Fluke	CC 630609-01	30 October 2021
2.3 Thermo-Hygro Meter	NFI.BTH003/17	PONPE	QR20-1578	21 September 2021

Certified Reference Material	Lot. No.	Manufacturer	Ref N	Expire Date
2.4 pH buffer 4.008 (Primary pH buffer Solution)	710048	CPAchem	PH216.L5	2 October 2022
2.5 pH buffer 6.865 (Primary pH buffer Solution)	710049	CPAchem	PH217.L5	2 October 2022
2.6 pH buffer 10.01 (Primary pH buffer Solution)	710050	CPAchem	PH220.L5	2 October 2021
2.7 pH buffer 7.00 (Standard pH buffer Solution)	710051	CPAchem	PH107.L5	2 October 2021

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

3.1 Instruments No.2.1	through	NSC-TISI-TIS 17025 Laboratory Accreditation of Calibration No.0075
3.2 Instruments No.2.2	through	NSC-TISI-TIS 17025 Laboratory Accreditation of Calibration No.0061
3.3 Instruments No.2.3	through	NSC-TISI-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 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 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.

เอกสารไม่ควบคุม

## Calibration Report

Certificate No.: 2103189-001-01

Equipment: pH Meter  
Resolution: 0.01 pH ; 0.1 mV  
Manufacturer: METTLER TOLEDO Model: SevenCompact S220  
Serial No.: C113432421 Type: Bench top  
ID No.: UAE.WAT.009/2564

Date of Calibration: 14 June 2021 Page 3 of 5

### Calibration Results:

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

Nominal pH	DC Voltage Standard ( mV )	Average Indicator Reading		Uncertainty ( ± mV )	Coverage Factor ( k )
		mV	pH		
0.00	414.118	414.1	0.00	0.063	2.00
2.00	295.811	295.8	2.00	0.063	2.00
4.00	177.461	177.4	4.00	0.063	2.00
6.00	59.160	59.2	6.00	0.063	2.00
7.00	0.000	0.0	7.00	0.063	2.00
8.00	-59.158	-59.1	8.00	0.063	2.00
10.00	-177.461	-177.4	10.00	0.063	2.00
12.00	-295.812	-295.8	12.00	0.063	2.00
14.00	-414.118	-414.1	14.00	0.063	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.: 1115810 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	181.5	99.6	0.0071	2.00
6.866	6.87	12.9		0.0075	2.00
6.866	6.87	12.9	99.1	0.0075	2.00
10.008	10.01	-171.2		0.0093	2.00
6.985	6.99	5.4	-	0.0093	2.00

เอกสารไม่ควบคุม

## Calibration Report

**Certificate No.:** 2103189-001-01

**Equipment:** Digital Thermometer with RTD (pH Meter)

Resolution: 0.1 °C Model: SevenCompact S220

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

Manufacturer: METTLER TOLEDO

**Date of Calibration:** 14 June 2021

Page 4 of 5

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

**Environment Condition:** Ambient Temperature 24 °C ± 1 °C

Relative Humidity 54 % ± 2 %

### Condition of this results of Calibration:

- 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 640028-01	12-Dec-21	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

- 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.

### 6. Condition of Calibrated item :

Good

### 7. Result of Calibration :

☒

Without adjustment

☐

After adjustment

## Calibration Report

**Certificate No.:** 2103189-001-01

**Equipment:** Digital Thermometer with RTD (pH Meter)

Resolution: 0.1 °C Model: SevenCompact S220

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

Manufacturer: METTLER TOLEDO

**Date of Calibration:** 14 June 2021

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**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 100 mm.
- Description of probe, model : InLab Expert Pro-ISM S/N : 1115810
- Dimension of probe : Diameter 12 mm., Length 120 mm.,
- Sheath material : Plastic (PEEK)

UUC* Reading (°C)	Standard Temperature (°C)	Correction Value (°C)	Uncertainty ± (°C)
14.9	15.001	0.1	0.13
24.9	24.999	0.1	0.13
35.0	34.999	0.0	0.13

### 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 -----





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.: 21TM1405  
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 :** 17 August 2021  
**Calibration Date :** 17 August 2021  
**Ambient Temperature :** ( 26 ± 10 ) °C  
**Relative Humidity :** ( 50 ± 30 ) %  
**Calibrated by :** Khit Ruttanaprapachai

**Approved by :**

Malee  
Approved Signatory

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

**Issue Date :** 1 September 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.

เอกสารไม่ควบคุม  
A 0031567



**Equipment :** BOD Incubator  
**Condition As-Received :** Used Item  
**Reference :** 2108-0364OC-1  
**Procedure Used :-**

**Cert. No.:** 21TM1405  
**Page.:** 2 of 3

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	21LM2	18 Feb 2022

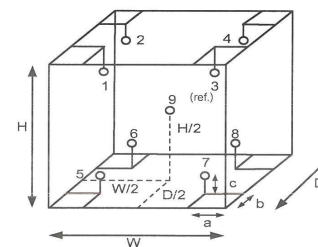
2. This certificate is valid only to the item calibrated on date and place of calibration.

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

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

**Function of UUC\* :** Temperature Source

**Fresh air setting :** Not Available



**Probe Installation Details :**

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

**Dimension of Chamber :**

D = 0.53 m  
W = 1.2 m  
H = 1.2 m  
Capacity = 0.76 m<sup>3</sup>

Environment during calibration		
	Beginning	Finished
Temp. ( °C )	28	29
REL.Humid. ( % )	52	55
AC Supply ( Volt )	220	221

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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a 1069646



Equipment : BOD Incubator  
 Condition As-Received : Used Item  
 Reference : 2108-0364OC-1  
 Result of Calibration :- ( \* ) Without Adjustment  
 Function of UUC\* : Temperature Source  
 Fresh air setting : Not Available

Cert. No.: 21TM1405  
 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 k
20.0	19.5	19.3	0.46	0.45	1.0	0.78	2

Calibration Point ( °C )	Measured Temperature ( °C )								
	Position								
	1	2	3	4	5	6	7	8	9 (ref.)
20.0	20.018	20.137	20.086	19.942	20.157	20.093	19.968	19.860	20.048

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 1069645



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.: 21TM1406  
 Page.: 1 of 3

## Certificate of Calibration

Equipment : BOD Incubator  
 Manufacturer : Arco  
 Model : UC4-1320  
 Serial No. : -  
 ID No. : UAE.WAO.018/2559  
 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 : 17 August 2021  
 Calibration Date : 17 August 2021  
 Ambient Temperature : ( 26 ± 10 ) °C  
 Relative Humidity : ( 50 ± 30 ) %  
 Calibrated by : Khit Ruttanaprapachai

Approved by : Malee  
 Approved Signatory

( ) Pornthippa Tameyakul  
 (✓) Malee Butkruea  
 ( ) Suwit Imjai

Issue Date : 1 September 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.

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A 0031568



**Equipment :** BOD Incubator  
**Condition As-Received :** Used Item  
**Reference :** 2108-0364OC-2

**Cert. No.:** 21TM1406  
**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	21LM2	18 Feb 2022

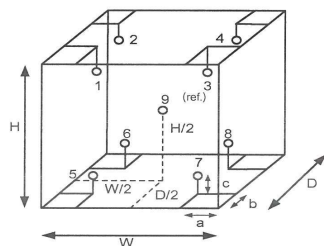
2. This certificate is valid only to the item calibrated on date and place of calibration.

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

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

**Function of UUC\* :** Temperature Source

**Fresh air setting :** Not Available



**Probe Installation Details :**

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

**Dimension of Chamber :**

D = 0.53 m  
 W = 1.2 m  
 H = 1.2 m  
 Capacity = 0.76 m<sup>3</sup>

Environment during calibration		
	Beginning	Finished
Temp. ( °C )	28	29
REL.Humid. ( % )	52	55
AC Supply ( Volt )	220	221

Position :	Ref. Std. ID No.:
1	21-04RTD-11
2	21-04RTD-12
3	21-04RTD-13
4	21-04RTD-14
5	21-04RTD-15
6	21-04RTD-16
7	21-04RTD-17
8	21-04RTD-18
9 (ref.)	21-04RTD-19

*Malu*

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a 1069644



**Equipment :** BOD Incubator  
**Condition As-Received :** Used Item  
**Reference :** 2108-0364OC-2

**Cert. No.:** 21TM1406  
**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 )	Uncertainty ( ± °C )	Coverage Factor k
20.0	19.8	19.7	0.37	0.50	1.1	0.62	2

Calibration Point ( °C )	Measured Temperature ( °C )								
	Position								
	1	2	3	4	5	6	7	8	9 (ref.)
20.0	20.040	19.742	20.203	19.762	19.784	19.819	19.764	19.797	19.787

**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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*Malu*

เอกสารไม่ควบคุม  
a 1069644



## 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  
Scientist

**Approved by**   
( Mr.Pheraphat Tuanjit )

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.

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## Calibration Report

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

**Date of Calibration:** 24 November 2021

Page 2 of 4

**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	Model	Serial No.	Calibrated By	Certificate No.	Due Date
Thermo-Hygro Meter	11A1	สว.พ.ล. BTH 003/55	Quality Reborn	QR21-0297	15 February 2022

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:**

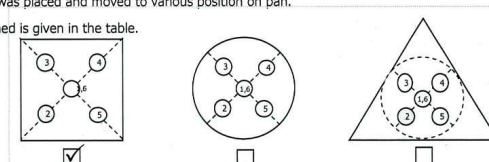
**1. Repeatability of Reading:**

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

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## 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

**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 <i>k</i>
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

**Model:** AX 105 DR

**Resolution:** 0.00001 g/ 0.0001 g

**Serial No.:** 1122100406

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

**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 <i>k</i>
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 %.

----- End -----



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.: 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 :**   
Approved Signatory

( ) Pornthippa Tameyakul  
( ) Malee Butkruea  
( ) Suwit Imjai

**Issue Date :** 4 November 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.



**Equipment :** Hot Air Oven  
**Condition As-Received :** Used Item  
**Reference :** 2110-0701OC-1

**Cert. No.:** 21TM1876  
**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	34970A	MY44067817	21LM10	20 Jul 2022

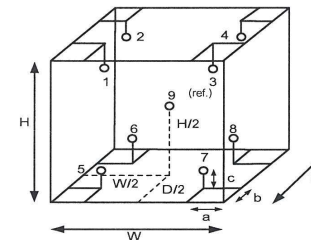
2. This certificate is valid only to the item calibrated on date and place of calibration.

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

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

**Function of UUC\* :** Temperature Source

**Fresh air setting :** Close



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

**Probe Installation Details :**  
a = 5.0 cm  
b = 5.0 cm  
c = 5.0 cm

**Dimension of Chamber :**  
D = 0.33 m  
W = 0.40 m  
H = 0.40 m  
Capacity = 0.053 m<sup>3</sup>

Ref. Std. ID No.: @ Calibration Point		
Position :	( 140, 180 ) °C	( 104 ) °C
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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เอกสารไม่ควบคุม



Equipment : Hot Air Oven  
Condition As-Received : Used Item  
Reference : 2110-0701OC-1  
Result of Calibration :- ( \* ) Without Adjustment

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

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 )	Uncertainty ( ± °C )	Coverage Factor k
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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Malee

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



Cert. No.: 22TM304  
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 : 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

( ) Pornthippa 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.

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A 0040245





Equipment : Hot Air Oven  
 Condition As-Received : Used Item  
 Reference : 2204-0015OC-1

Cert. No.: 22TM304  
 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	34970A	MY41021843	22LM4	10 Jan 2023

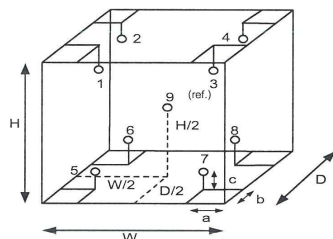
2. This certificate is valid only to the item calibrated on date and place of calibration.

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

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

**Function of UUC\* :** Temperature Source

**Fresh air setting :** Close



Environment during calibration		
	Beginning	Finished
Temp. ( °C )	28	28
REL.Humid. ( % )	56	55
AC Supply ( Volt )	221	224

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 ( °C )		
Position :	( 120 , 180 )	( 104 )
1	21-04TC-01	18-04RTD-01
2	21-04TC-02	18-04RTD-02
3	21-04TC-03	18-04RTD-03
4	21-04TC-04	18-04RTD-04
5	21-04TC-05	18-04RTD-05
6	21-04TC-06	18-04RTD-06
7	21-04TC-07	18-04RTD-07
8	21-04TC-08	18-04RTD-08
9 (ref.)	21-04TC-09	18-04RTD-09

Maku.

เอกสารไม่ควบคุม

a 1104316



Equipment : Hot Air Oven  
 Condition As-Received : Used Item  
 Reference : 2204-0015OC-1

Cert. No.: 22TM304  
 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 )	Uncertainty ( ± °C )	Coverage Factor k
104.0	104.0	104.0	0.040	0.57	0.80	0.42	2
120.0	120.0	120.0	0.11	0.82	1.1	1.1	2
180.0	180.0	180.0	0.12	1.4	2.0	1.1	2

Calibration Point ( °C )	Measured Temperature ( °C )								
	Position								
	1	2	3	4	5	6	7	8	9 (ref.)
104.0	104.403	104.220	104.517	104.474	103.778	103.859	104.292	104.357	104.319
120.0	120.183	119.878	120.238	120.355	119.476	119.455	120.046	120.173	120.199
180.0	180.502	179.929	180.655	180.797	179.012	179.044	180.043	180.305	180.340

**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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Maku.

เอกสารไม่ควบคุม

a 1104315

## Calibration Certificate

**Certificate No.:** 2103270-001-01  
**Client name:** UNITED ANALYST AND ENGINEERING CONSULTANT CO.,LTD.  
**Address:** 3 Soi Udomsuk 41, Sukhumvit Road,  
Bangchack, Prakanong, 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.:** 2103270

**Operation No.:** 2103270-001

**Date of Receipt:** 11 June 2021

**Date of Calibration:** 11 June 2021

**Calibrated by** Mr.Yothin Charoensuk  
Scientist

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

**Date of Issue:** 15 June 2021

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.

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## Calibration Report

**Certificate No.:** 2103270-001-01  
**Equipment:** Electronic Balance  
**Model:** AB204-S/FACT  
**Serial No.:** 1129361010  
**Capacity:** 220 g  
**Manufacturer:** Mettler Toledo  
**Resolution:** 0.0001 g  
**ID No.:** UAE.WAS.002/2552

Date of Calibration: 11 June 2021

Page 2 of 3

**Environment Condition:** Ambient Temperature: 21.1 ± 0.4 °C Relative Humidity: 48 ± 4 %

**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 Calibration of Weighing Machines : 2006

2. Reference Standards:

Reference Standard	Model	Serial No.	Calibrated By	Certificate No.	Due Date
Standard Weight Class E2	1mg to 200g	B505567572	TCS	M20040405	20 April 2022
Instrument	Model	Serial No.	Calibrated By	Certificate No.	Due Date
Thermo-Hygro Meter	PONPE 490	NFI.BTH 004/18	Quality Reborn	QR21-0300	15 February 2022

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:**

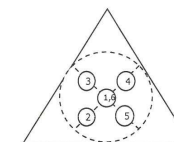
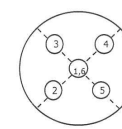
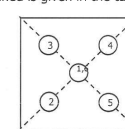
**1. Repeatability of Reading:**

Nominal Value ( g )	Standard Deviation of Reading ( g )
100	0.000067
200	0.000057

**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	49.9999	49.9999	50.0000	50.0000	50.0000	0.0001

เอกสารไม่ควบคุม

## Calibration Report

**Certificate No.:** 2103270-001-01

**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:** 11 June 2021

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 k
Unload	0.00000	0.0000	0.0000	0.000092	2.00
0.01	0.01000	0.0100	0.0000	0.000092	2.00
0.05	0.05000	0.0500	0.0000	0.000092	2.00
0.1	0.10001	0.1000	0.0000	0.000093	2.00
0.2	0.20001	0.2001	-0.0001	0.000093	2.00
0.5	0.50001	0.5000	0.0000	0.000093	2.00
1	1.00001	1.0000	0.0000	0.000093	2.00
2	2.00002	2.0001	-0.0001	0.000093	2.00
5	5.00002	4.9999	0.0001	0.000094	2.00
10	10.00001	9.9999	0.0001	0.000096	2.00
20	20.00003	20.0000	0.0000	0.00010	2.00
50	50.00004	50.0000	0.0000	0.00012	2.00
70	70.00007	70.0000	0.0001	0.00014	2.00
100	100.00009	100.0000	0.0001	0.00016	2.00
150	150.00013	150.0000	0.0001	0.00021	2.00
200	200.00016	200.0001	0.0001	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 %.

----- End -----

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TECHNOLOGY PROMOTION ASSOCIATION (THAILAND-JAPAN)

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534/4 PATTANAKARN ROAD SOI 18, SUANLUANG, SUANLUANG BANGKOK 10250

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



Cert. No.: 22TM335

Page.: 1 of 3

## Certificate of Calibration

**Equipment :** Incubator

**Manufacturer :** Binder

**Model :** BD 53 E2

**Serial No. :** 13-07343

**ID No. :** UAE.MIC.005/2558

**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

( ) Pornthippa Tameyakul

(✓) Malee Butkruea

**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.

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**Equipment :** Incubator  
**Condition As-Received :** Used Item  
**Reference :** 2202-0444OC-2  
**Procedure Used :-**

**Cert. No.:** 22TM335  
**Page.:** 2 of 3

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	MY44067817	21LM10	20 Jul 2022

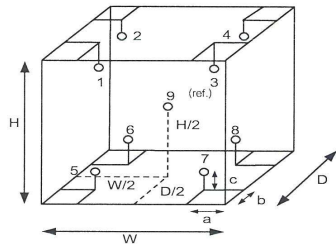
2. This certificate is valid only to the item calibrated on date and place of calibration.

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

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

**Function of UUC\* :** Temperature Source

**Fresh air setting :** Close



**Probe Installation Details :**

a = 5.0 cm  
b = 5.0 cm  
c = 5.0 cm

**Dimension of Chamber :**

D = 0.33 m  
W = 0.40 m  
H = 0.40 m  
Capacity = 0.053 m<sup>3</sup>

Environment during calibration		
	Beginning	Finished
Temp. ( °C )	21	22
REL.Humid. ( % )	65	62
AC Supply ( Volt )	229	230

Position :	Ref. Std. ID No.:
1	15RTD2/11
2	15RTD2/12
3	15RTD2/13
4	15RTD2/14
5	15RTD2/15
6	15RTD2/16
7	15RTD2/17
8	15RTD2/18
9 (ref.)	15RTD2/19

เอกสารไม่ควบคุม

a 1096059



**Equipment :** Incubator  
**Condition As-Received :** Used Item  
**Reference :** 2202-0444OC-2  
**Result of Calibration :-** ( \* ) Without Adjustment

**Cert. No.:** 22TM335  
**Page.:** 3 of 3

**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 )	Uncertainty ( ± °C )	Coverage Factor k
35.0	34.9	34.9	0.024	0.47	0.70	0.30	2

Calibration Point ( °C )	Measured Temperature ( °C )								
	Position								
	1	2	3	4	5	6	7	8	9 (ref.)
35.0	35.184	35.333	35.121	35.141	34.725	34.969	34.665	34.726	34.897

**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

a 1096058

## กำหนดจุดห้ามใช้งาน

References Certificate Number. : 22TM335

Equipment : Incubator

Model : BD 53

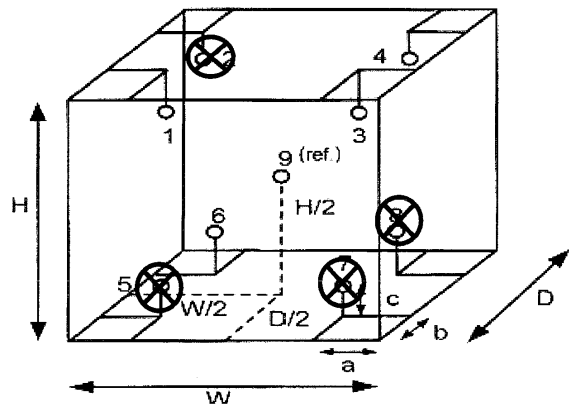
Serial No. : 13-07343

ID No. : UAE.MIC.005/2558

Manufacturer : Binder

Calibration Point : 35 °C

Unit Under Calibration Setting : 34.9 °C



รูปภาพเครื่องมือ แสดงจุดที่ได้รับการสอบเทียบ และสัญลักษณ์ ⊗ แสดงจุดห้ามใช้งาน

กำหนดจุดห้ามใช้งานตำแหน่งที่....2,5,7,8.....

หมายเหตุ เก็บในแฟ้ม...../.....

\\uae.netapp\Netapp\_LAB\Lab-BK\INSTRUMENT (11-2)\6.4\Certificate\ป้ายห้ามใช้งานเครื่องมือ\ป้ายห้ามใช้งานเครื่องมือ 2565\กำหนดจุดห้ามใช้งาน  
Incubator\_UAE.MIC.005\_2558#22TM335.doc

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TECHNOLOGY PROMOTION ASSOCIATION (THAILAND-JAPAN)  
CORPORATE SERVICES 3: EQUIPMENT CALIBRATION AND TESTING SERVICES  
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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, 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 Hlahib  
Approved by : Malee Butkruea  
Approved Signatory  
( ) Pornthippa Tameyakul  
( / ) Malee Butkruea  
( ) Suwit Imjai  
Issue Date : 20 July 2021

The Uncertainties are for a confidence probability of approximately 95 %

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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

Calibration Point ( °C )	Measured Temperature ( °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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Malu .

เอกสารไม่ควบคุม  
a 1064477



Equipment : Incubator  
Condition As-Received : Used Item  
Reference : 2107-0318OC-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

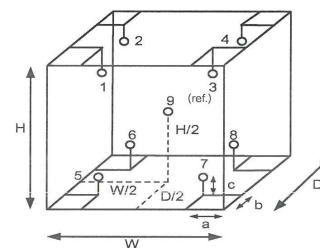
2. This certificate is valid only to the item calibrated on date and place of calibration.

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 :

a = 5.0 cm  
b = 5.0 cm  
c = 5.0 cm

Dimension of Chamber :

D = 0.40 m  
W = 0.33 m  
H = 0.40 m  
Capacity = 0.053 m<sup>3</sup>

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

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

Malu .

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a 1064478



TECHNOLOGY PROMOTION ASSOCIATION (THAILAND-JAPAN)  
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Cert. No.: 21TM1358  
Page.: 1 of 3

## Certificate of Calibration

**Equipment :** Incubator  
**Manufacturer :** Memmert  
**Model :** BE 400  
**Serial No. :** e402.1032  
**ID No. :** UAE.MIC.001/2546  
**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 :** 15 July 2021  
**Ambient Temperature :** ( 26 ± 10 ) °C  
**Relative Humidity :** ( 50 ± 30 ) %

**Calibrated by :** Preecha Hlahib

**Approved by :**   
Approved Signatory

( ) Pornthippa Tameyakul  
( ) Malee Butkruea  
( ) Suwit Imjai

**Issue Date :** 20 July 2021

The Uncertainties are for a confidence probability of approximately 95%

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**Equipment :** Incubator  
**Condition As-Received :** Used Item  
**Reference :** 2107-0318OC-2

Cert. No.: 21TM1358  
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

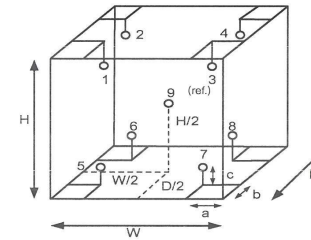
2. This certificate is valid only to the item calibrated on date and place of calibration.

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 :

a = 5.0 cm  
b = 5.0 cm  
c = 5.0 cm

### Dimension of Chamber :

D = 0.40 m  
W = 0.33 m  
H = 0.40 m  
Capacity = 0.053 m<sup>3</sup>

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

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

เอกสารไม่ควบคุม



Equipment : Incubator  
Condition As-Received : Used Item  
Reference : 2107-0318OC-2  
Result of Calibration :- ( \* ) Without Adjustment  
Function of UUC\* : Temperature Source

Cert. No.: 21TM1358  
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>
56.0	57.1	57.1	0.23	0.88	1.4	0.42	2

Calibration Point ( °C )	Measured Temperature ( °C )								
	Position								
	1	2	3	4	5	6	7	8	9 (ref.)
56.0	56.743	56.530	56.340	56.453	55.653	56.192	55.439	55.878	56.243

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



Cert. No.: 22TM672  
Page.: 1 of 3

## Certificate of Calibration

Equipment : Incubator  
Manufacturer : Memmert  
Model : IPP 260  
Serial No. : V616.0066  
ID No. : UAE.MIC.032/2559  
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 : 5 May 2022  
Ambient Temperature : ( 26 ± 10 ) °C  
Relative Humidity : ( 50 ± 30 ) %  
Calibrated by : Preecha Hlahib

Approved by :   
Approved Signatory

( ) Pornthippa Tameyakul  
( ✓ ) Malee Butkruea  
( ) Suwit Imjai

Issue Date : 11 May 2022

The Uncertainties are for a confidence probability of approximately 95%

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Equipment : Incubator  
 Condition As-Received : Used Item  
 Reference : 2205-0003OC-3

Cert. No.: 22TM672  
 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	MY44067817	21LM10	20 Jul 2022

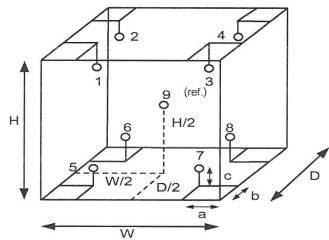
2. This certificate is valid only to the item calibrated on date and place of calibration.

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

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

**Function of UUC\* :** Temperature Source

**Fresh air setting :** Not Available



**Probe Installation Details :**

a = 5.0 cm  
 b = 5.0 cm  
 c = 5.0 cm

**Dimension of Chamber :**

D = 0.50 m  
 W = 0.60 m  
 H = 0.80 m  
 Capacity = 0.24 m<sup>3</sup>

Environment during calibration		
	Beginning	Finished
Temp. ( °C )	25	23
REL.Humid. ( % )	62	57
AC Supply ( Volt )	221	221

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

เอกสารไม่ควบคุม



Equipment : Incubator  
 Condition As-Received : Used Item  
 Reference : 2205-0003OC-3  
**Result of Calibration :-** ( \* ) Without Adjustment

Cert. No.: 22TM672  
 Page.: 3 of 3

**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 k
25.0	25.0	25.0	0.021	0.18	0.33	0.30	2
36.0	36.0	36.0	0.077	0.96	1.8	0.33	2

Calibration Point ( °C )	Measured Temperature ( °C )								
	Position								
	1	2	3	4	5	6	7	8	9 (ref.)
25.0	25.221	25.146	25.127	25.113	24.968	24.986	24.933	25.017	25.047
36.0	35.637	35.238	36.130	36.515	36.928	36.845	36.630	36.761	36.113

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



Cert. No.: 22TM563  
Page.: 1 of 3

## Certificate of Calibration

**Equipment :** Incubator  
**Manufacturer :** Memmert  
**Model :** IPP 260  
**Serial No. :** V615.0187  
**ID No. :** UAE.MIC.003/2559  
**Submitted by :** United Analyst and Engineering Consultant Co.,Ltd.  
3 Soi Udomsuk 41, Sukhumvit Road,  
Bangchak, Phrakhanong,  
Bangkok 10260  
**Location :** Microbiology Laboratory  
**Received Order :** 7 April 2022  
**Calibration Date :** 7 April 2022  
**Ambient Temperature :**  $(26 \pm 10) ^\circ\text{C}$   
**Relative Humidity :**  $(50 \pm 30) \%$   
**Calibrated by :** Prawit Sodavitchit

**Approved by :**   
Approved Signatory

( ) Pornthippa 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 0040248



**Equipment :** Incubator  
**Condition As-Received :** Used Item  
**Reference :** 2204-0016OC-1  
**Procedure Used :-**

Cert. No.: 22TM563  
Page.: 2 of 3

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	MY44067817	21LM10	20 Jul 2022

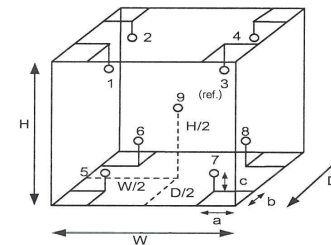
2. This certificate is valid only to the item calibrated on date and place of calibration.

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

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

**Function of UUC\* :** Temperature Source

**Fresh air setting :** Close



### Probe Installation Details :

a = 5.0 cm  
b = 5.0 cm  
c = 5.0 cm

### Dimension of Chamber :

D = 0.50 m  
W = 0.64 m  
H = 0.80 m  
Capacity = 0.26 m<sup>3</sup>

Environment during calibration		
	Beginning	Finished
Temp. ( °C )	26	26
REL.Humid. ( % )	60	62
AC Supply ( Volt )	220	220

Position :	Ref. Std. ID No.:
1	15RTD2/11
2	15RTD2/12
3	15RTD2/13
4	15RTD2/14
5	15RTD2/15
6	15RTD2/16
7	15RTD2/17
8	15RTD2/18
9 (ref.)	15RTD2/19

เอกสารไม่ควบคุม

a 1104310



Equipment : Incubator  
 Condition As-Received : Used Item  
 Reference : 2204-0016OC-1  
 Result of Calibration :- ( \* ) Without Adjustment  
 Function of UUC\* : Temperature Source  
 Fresh air setting : Close

Cert. No.: 22TM563  
 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>
35.0	35.0	35.0	0.12	0.53	0.79	0.30	2

Calibration Point ( °C )	Measured Temperature ( °C )								
	Position								
	1	2	3	4	5	6	7	8	9 (ref.)
35.0	35.170	35.167	34.938	34.844	34.816	34.854	34.584	34.730	34.780

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*

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a 1104309



TECHNOLOGY PROMOTION ASSOCIATION (THAILAND-JAPAN)  
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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 Hlahib

Approved by : *Malee*  
 Approved Signatory

( ) Pornthippa Tameyakul  
 ( ✓ ) Malee Butkruea  
 ( ) Suwit Imjai

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

Cert. No.: 21TM1355/1  
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	34972A	MY57013823	21LM3	26 Feb 2022

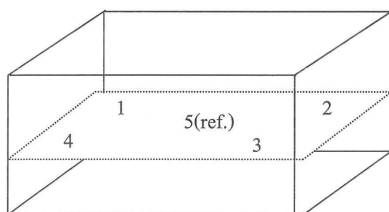
2. This certificate is valid only to the item calibrated on date and place of calibration.

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. )	
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

Malu .

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 )				
			Position				
			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 %.

-oOo-

Malu .

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a 1065655



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Cert. No.: 21TM1356  
Page.: 1 of 3

## Certificate of Calibration

**Equipment :** Water Bath  
**Manufacturer :** Memmert  
**Model :** WNB 14  
**Serial No. :** L407.0756  
**ID No. :** UAE.MIC.024/2550  
**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 Hlahib

**Approved by :**

*Malee*  
Approved Signatory

- ( ) Pornthippa Tameyakul  
(✓) Malee Butkruea  
( ) Suwit Imjai

**Issue Date :** 20 July 2021

The Uncertainties are for a confidence probability of approximately 95%

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**Equipment :** Water Bath  
**Condition As-Received :** Used Item  
**Reference :** 2107-0318OC-6  
**Result of Calibration :-** ( \* ) Without Adjustment  
**Function of UUC\* :** Temperature Source

Cert. No.: 21TM1356  
Page.: 3 of 3

Calibration point ( °C )	UUC* Setting ( °C )	UUC* Reading ( °C )	Average* Standard Reading ( °C )				
			Position				
			1	2	3	4	5 (ref.)
44.5	45.0	45.0	44.480	44.502	44.490	44.486	44.483

Calibration point ( °C )	Uniformity ( °C )	Stability ( ± °C )	Uncertainty ( ± °C )	Coverage Factor <i>k</i>
44.5	0.072	0.053	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 %.

-o0o-

*Malee*  
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Equipment : Water Bath  
 Condition As-Received : Used Item  
 Reference : 2107-0318OC-6  
 Procedure Used :-

Cert. No.: 21TM1356  
 Page.: 2 of 3

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

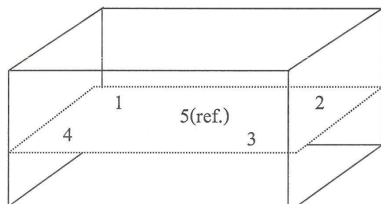
2. This certificate is valid only to the item calibrated on date and place of calibration.

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

*Malee*  
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## Certificate of Calibration

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

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 : *Malee*  
 Approved Signatory  
 ( ) Pornthippa Tameyakul  
 (✓) Malee Butkruea  
 ( ) Suwit Imjai  
 Issue Date : 22 February 2022

The Uncertainties are for a confidence probability of approximately 95%

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

Calibration were conducted using in-house calibration procedure CP-OT03 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\*\*

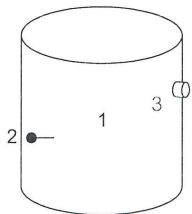
(\*\* = Categorization of pathogens according to hazard and categories of containment, second edition, 1990 )

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

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

**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 <i>k</i>
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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Cert. No.: 21TM831  
Page.: 1 of 3

## Certificate of Calibration

**Equipment :** Autoclave  
**Manufacturer :** ALP  
**Model :** CL-40L  
**Serial No. :** 807298  
**ID No. :** UAE.MIC.019/2560  
**Submitted by :** United Analyst and Engineering Consultant Co.,Ltd.  
3 Soi Udomsuk 41, Sukhumvit Road,  
Bangchak, Phrakhanong,  
Bangkok 10260  
**Location :** 301 Room  
**Received Order :** 7 May 2021  
**Calibration Date :** 7 May 2021  
**Ambient Temperature :** ( 26 ± 10 ) °C  
**Relative Humidity :** ( 50 ± 30 ) %  
**Calibrated by :** Khit Ruttanaprapachai  
**Approved by :**   
( ) Pornthippa Tameyakul  
( ✓ ) Malee Butkruea  
( ) Suwit Imjai  
**Issue Date :** 18 May 2021

The Uncertainties are for a confidence probability of approximately 95%

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**Equipment :** Autoclave  
**Condition As-Received :** Used Item  
**Reference :** 2105-0012OC-1  
**Result of Calibration :-** ( \* ) Without Adjustment

Cert. No.: 21TM831  
Page.: 3 of 3

**Operating parameter Set : Temperature =** 116 °C  
**Sterilization period =** 15 minute

UUC* Setting ( °C )	UUC* Reading ( °C )	Position	Average* Standard Reading ( °C )	Stability ( ± °C )	Pressure Reading ( MPa )	Uncertainty ( ± °C )	Coverage Factor k
116	116	1	116.744	0.12	0.08	0.90	2
		2	116.549				
		3	116.515				

**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	122.672	0.076	0.12	1.1	2
		2	122.469				
		3	122.414				

**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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Equipment : Autoclave  
Condition As-Received : Used Item  
Reference : 2105-0012OC-1  
Procedure Used :-

Cert. No.: 21TM831  
Page.: 2 of 3

Calibration were conducted using in-house calibration procedure CP-OT03 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	34972A	MY57013711	20LM7	18 May 2021

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\*\*

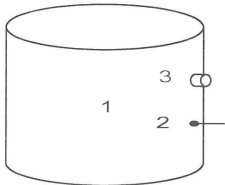
(\*\* = Categorization of pathogens according to hazard and categories of containment, second edition, 1990 )

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	24	62	222
Finished of Calibration	25	63	221

Position	Description	Ref. Std. ID No.:
1 =	Center of chamber	18-18TC-04
2 =	Temperature sensor	18-18TC-05
3 =	Exhaust port	18-18TC-06

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National Food Institute, Ministry of Industry, Thailand

2008 Soi 36, Arun Amarin Road, Bang Yi Khan Subdistrict, Bang Phlat District, Bangkok 10700, Thailand.  
Tel : +66 (0) 2422 8688 Fax : +66 (0) 2422 8545 Website : www.nfi.or.th E-mail : cal@nfi.or.th



## Verification Certificate

**Certificate No.:** 2202361-001-01  
**Client name:** UNITED ANALYST AND ENGINEERING CONSULTANT CO., LTD.  
**Address:** 3 Soi Udomsuk 41, Sukhumvit Road,  
Bangchack, Prakanong, 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.:** 2202361  
**Operation No.:** 2202361-001  
**Date of Receipt:** 4 April 2022  
**Date of Calibration:** 4-6 April 2022

**Calibrated by** Mr.Nuttapol Niyomchat  
Specialist

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

**Date of Issue:** 11 April 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

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## Verification Report

**Certificate No.:** 2202361-001-01  
**Equipment:** HEATING BLOCK DIGESTION  
 Model: 2520 Serial No.: 91794469  
 Resolution: 1 °C ID No.: UAE.WAS.011/2560  
 Manufacturer: FOSS  
**Date of Calibration:** 4-6 April 2022

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 results 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/34901A	MY44045576/MY41194453	TC21/0041	24-Apr-2022	N.M. Technical Center Laboratory
	Type R	TC#101-103 / CH#101-103			

- 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.

## 6. Condition of Calibrated item : Good

UUC\* Description

Time of Record - Hour 30 Minute At 380 °C

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

## Verification Report

**Certificate No.:** 2202361-001-01  
**Equipment:** HEATING BLOCK DIGESTION  
 Model: 2520 Serial No.: 91794469  
 Resolution: 1 °C ID No.: UAE.WAS.011/2560  
 Manufacturer: FOSS  
**Date of Calibration:** 4-6 April 2022

Page 3 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	0.13	376.48	1.5
2	380	380	0.12	376.58	1.5
3	380	380	0.12	376.51	1.5
4	380	380	0.14	376.70	1.6
5	380	380	0.18	376.81	1.6
6	380	380	0.12	377.23	1.6
7	380	380	0.12	377.37	1.5
8	380	380	0.13	376.68	1.5
9	380	380	0.14	376.72	1.5
10	380	380	0.18	378.97	1.6
11	380	380	0.25	378.79	1.6
12	380	380	0.11	377.14	1.6
13	380	380	0.19	379.65	1.6
14	380	380	0.16	379.61	1.6
15	380	380	0.16	378.66	1.6
16	380	380	0.15	379.18	1.6
17	380	380	0.23	377.39	1.6
18	380	380	0.11	377.71	1.6
19	380	380	0.22	376.64	1.6
20	380	380	0.16	376.56	1.6

**Note:**

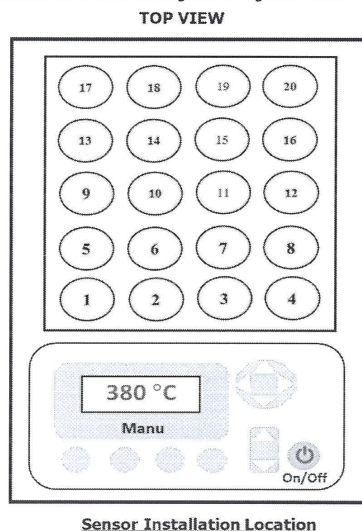
- UUC\* = Unit Under Calibration
- Immersion depth of standard thermometer in tube level high of sand is equal heater plate of UUC.
- Stability = One-half of the greatest maximum difference of measured temperatures at one sensors, for at least half an hour after reaching steady state.

## Verification Report

**Certificate No.:** 2202361-001-01  
**Equipment:** HEATING BLOCK DIGESTION  
 Model: 2520 Serial No.: 91794469  
 Resolution: 1 °C ID No.: UAE.WAS.011/2560  
 Manufacturer: FOSS  
**Date of Calibration:** 4-6 April 2022  
**Calibration point:** 380 °C  
**Calibration result:** Continued

Page 4 of 4

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

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 -----

## Verification Certificate

**Substitute for Certificate No.:** 2103014-001-01  
**Certificate No.:** 2103014-001-02  
**Client name:** UNITED ANALYST AND ENGINEERING CONSULTANT CO., LTD.  
**Address:** 3 SOI UDOMSUK 41, SUKHUMVIT ROAD,  
 BANGCHAK, PRAKHANONG, BANGKOK, 10260

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**Equipment:** HEATING BLOCK DIGESTION  
**Manufacturer:** VELP SCIENTIFICA  
**Model:** DKL20  
**Serial No.:** 213517  
**ID No.:** UAE.WAS.005/2555  
**Order No.:** 2103014  
**Operation No.:** 2103014-001  
**Date of Receipt:** 30 May 2021  
**Date of Calibration:** 2,7 June 2021

**Calibrated by** Mr.Nuttapol Niyomchat  
Expert

**Approved by**   
( Mr.Pheraphat Tuanjit )

**Date of Issue:** 25 June 2021

**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.



## Verification Report

**Certificate No.:** 2103014-001-02  
**Equipment:** HEATING BLOCK DIGESTION  
 Model: DKL20 Serial No.: 213517  
 Resolution: 1 °C ID No.: UAE.WAS.005/2555  
 Manufacturer: VELP SCIENTIFICA  
**Date of Calibration:** 2,7 June 2021

Page 2 of 4

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

### Condition of this results 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/34901A Type R	MY44045576/MY41194453 TC#101-103 / CH#101-103	TC21/0041	24-Apr-2022	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

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


  
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## Verification Report

**Certificate No.:** 2103014-001-02  
**Equipment:** HEATING BLOCK DIGESTION  
 Model: DKL20 Serial No.: 213517  
 Resolution: 1 °C ID No.: UAE.WAS.005/2555  
 Manufacturer: VELP SCIENTIFICA  
**Date of Calibration:** 2,7 June 2021

Page 3 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	379 - 380	0.53	383.17	1.8
2	380	379 - 380	0.32	383.16	1.8
3	380	379 - 380	0.39	382.96	1.8
4	380	379 - 380	0.18	381.23	1.8
5	380	379 - 380	0.49	382.97	1.8
6	380	379 - 380	0.49	382.85	1.8
7	380	379 - 380	0.54	382.97	1.8
8	380	379 - 380	0.24	382.95	1.8
9	380	379 - 380	0.61	383.17	1.8
10	380	379 - 380	0.73	381.14	1.9
11	380	379 - 380	0.73	382.53	1.9
12	380	379 - 380	0.76	381.56	1.9
13	380	379 - 380	0.38	382.25	1.7
14	380	379 - 380	0.43	383.00	1.7
15	380	379 - 380	0.31	383.08	1.7
16	380	379 - 380	0.22	381.78	1.7
17	380	379 - 380	0.31	382.99	1.7
18	380	379 - 380	0.37	383.24	1.7
19	380	379 - 380	0.32	380.98	1.7
20	380	379 - 380	0.31	382.63	1.7

### 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.

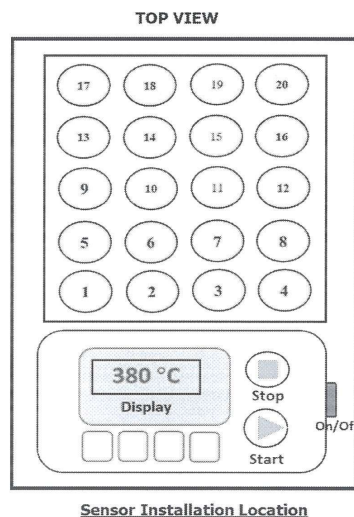

  
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## Verification Report

Certificate No.: 2103014-001-02  
 Equipment: HEATING BLOCK DIGESTION  
 Model: DKL20 Serial No.: 213517  
 Resolution: 1 °C ID No.: UAE.WAS.005/2555  
 Manufacturer: VELP SCIENTIFICA  
 Date of Calibration: 2,7 June 2021  
 Calibration point: 380 °C  
 Calibration result: Continued

Page 4 of 4

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



Remark: Edited ID.No. from UAE.WAB.005/2555 to UAE.WAS.005/2555.

**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 -----

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# FOSS

## Customer Service Report

Date:	30/11/21	Report No:	5874
Customer:	UAE	Address:	41 ถนนสุขุมวิท แขวงคลองเตย เขตคลองเตย กรุงเทพมหานคร 10110
Instrument:	KT200	Serial:	91890529
Hours			
Start	Travel To Customer 8.00	Labour 9.00	Travel From Customer 14.00
Finish	9.00	14.00	15.00



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

PO/Quote Number: if applicable

PMA Type: Foss curve Pro Contract No.: if applicable

Details of Work / Test	Condition / Status
- Check Instrument	OK
- Check PM kit for KT200	Pass
- Check Safety Valve	Pass
- Check Rubber Grommet	Pass
- Check Seal	Pass
- Check Heating element	Pass
- Check New panel PCB	Pass
- Check safety door pass complete	Pass
- Clean & Lubricant	Pass
- Check Temperature	Pass
- Check Volume Alkali set 30ml to 28ml	Pass
Instrument Ready for Use	OK Not OK

Part No:	Batch	Description	Qty
10009965	11235-983	Foss PM kit KT200	1
15750024	29.08.21	Safety Valve	1
15990025	09.11.20	Rubber Grommet for Heating coil	2
10003512	02.08.21	Heating Element	1
10002762	16.11.20	Seal	1
60094273	19.08.20	KT200 new panel PCB	1
10009385	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

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# FOSS Preventive Maintenance Protocol

Customer : UAE

Instrument	Kjeltec™ 2100 = <i>kjeltec 200</i>	
Recommended PM interval (whichever occurs first between interval and no. of samples analysed)	12 months	No. of samples analysed (if applicable):
Preventive maintenance kit (P/N)	10009965	<i>S/N 91790524</i>

## 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.

## 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	<i>98</i>	At 50 ml -0/+3 ml	<input checked="" type="checkbox"/>
2	Check distillation volume		<i>120ml</i>	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"/>

## Dedicated Analytical Solutions

**FOSS Analytical A/S**  
69 Slangerupgate  
DK-3400 Hillerød  
Denmark

Tel +45 7010 3370  
Fax +45 7010 3371  
E-mail support@foss.dk  
Web www.foss.dk

**FOSS Analytical AB**  
Box 70  
SE-263 21 Höganäs  
Sweden

Tel +46 42 361500  
Fax +46 42 340349  
E-mail support@foss.dk  
Web www.foss.dk

## List of Instruments Certification for Water Quality Analysis

No.	Instrument/Equipment	Parameter	Manufacturer	Model/Serial No.	Calibrator	Certification No.	Date of Calibration	Due date of Calibration	Remark
Water									
1	pH Meter	pH	Horiba	LAQUA-PH210 HA1F0002	Technology Promotion Association (Thailand-Japan)	21CH1607	19 Nov 21	18 Nov 22	-



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.: 21CH1607  
Page.: 1 of 3

## Certificate of Calibration

**Equipment :** pH Meter  
**Manufacturer :** Horiba  
**Model :** LAQUA-PH210  
**Serial No. :** HA1F0002  
**ID No. :** UAE.EFM.200/2564(EFM.pH.08/64)  
**Condition As-Received:** Used Item  
**Received Date :** 18 November 2021  
**Calibration Date :** 19 November 2021  
**Reference :** 2111-0736WSC-1  
**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) %  
**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 Lerngagtrakul

**Approved by :**

*Malee*  
Approved Signatory

( / ) Malee Butkruea  
( ) Saithip Meangmai  
( ) Warakorn Lerngagtrakul

**Issue Date :** 25 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.

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Cert.No.: 21CH1607  
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	21E2682	25 Aug 2022
2) Ref. Standard Thermometer	4982054	110RC044	2111201	26 Oct 2022

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-1835

Buffer Solution	Manufacturer	Lot No.	Exp. date
pH 4.008	CPA chem	761016	02 Aug 2023
pH 6.982	CPA chem	761017	02 Aug 2022
pH 10.015	CPA chem	761018	02 Aug 2022

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.: HA1F0002	4.00	177.48	177.4	4.01	0.058	2.00
	7.00	0.00	-0.2	7.02	0.058	2.00
	7.00	0.00	-0.2	7.02	0.058	2.00
	10.00	-177.48	-177.6	10.01	0.058	2.00

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Cert.No.: 21CH1607

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.: 991E0471	4.008	4.01	172	0.0071	2.00
	6.982	6.98	-4	0.011	2.00
	6.982	6.98	-4	0.011	2.00
	10.015	10.01	-181	0.011	2.05

#### Function : Temperature Measurement

( \* ) Without adjustment

This equipment was connected with Temperature Probe;

- Model : 9652

- Serial No. : 991E0471

Dimension of probe;

- Length : 103 mm.

- Diameter : 16 mm.

- Immersion Depth : 90 mm.

Calibration Point ( $^{\circ}\text{C}$ )	Standard Temperature ( $^{\circ}\text{C}$ )	UUC* Reading ( $^{\circ}\text{C}$ )	Error ( $^{\circ}\text{C}$ )	Uncertainty of measurement ( $\pm$ $^{\circ}\text{C}$ )	Coverage factor $k$
25.0	25.002	25.0	-0.002	0.13	2.00
30.0	30.004	30.0	-0.004	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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