

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 HA0A0005 | Technology Promotion Association (Thailand-Japan) | 24CH39 | 10 Jan 24 | 9 Jan 25 | - |

รายการใบรับรองสอบเทียบ/ทวนสอบ เครื่องมือหลักประจำห้องปฏิบัติการวิเคราะห์ สำหรับวิเคราะห์คุณภาพสิ่งแวดล้อม

| No. | Instrument/Equipment | Parameter | Manufacturer | Model/Serial No. | Calibrator | Certification No. | Date of Calibration | Due date of Calibration* | Remark |
|---|---|---|-------------------------|----------------------------------|--|-------------------|---------------------|--------------------------|--------|
| เครื่องมือหลักประจำห้องปฏิบัติการวิเคราะห์คุณภาพน้ำ | | | | | | | | | |
| 1 | pH Meter | ค่าความเป็นกรด-ด่าง (pH) | Mettler-Toledo | Seven Easy S20 / 1230525212 | DKSH (Thailand) Ltd. | C07240167 | 9 Apr 24 | 8 Apr 25 | - |
| 2 | pH Meter | | Mettler-Toledo | SevenCompact S220/ C113432421 | National Food Institute, Ministry of Industry, Thailand | 2303560-001-01 | 26 Jun 23 | 25 Jun 24 | - |
| 3 | Analytical Balance (Readability 0.01 mg) | สารแขวนลอย (SS) สารที่ละลายได้ (TDS) | Mettler-Toledo | XSR205DU / C210685394 | National Food Institute, Ministry of Industry, Thailand | 2402283-002-01 | 2 Apr 24 | 1 Apr 25 | - |
| 4 | Hot Air Oven | | Memmert | UF55 / B216.1666 | National Food Institute, Ministry of Industry, Thailand | 2400141-001-01 | 11 Oct 23 | 10 Oct 24 | - |
| 5 | Analytical Balance (Readability 0.1 mg) | น้ำมันและไขมัน (Fat, Oil and Grease) | Mettler-Toledo | XSR204 / C117635043 | Technology Promotion Association (Thailand-Japan) | 24MM293 | 11 May 24 | 10 May 25 | - |
| 6 | BOD Incubator | บีโอดี (BOD) | Arco | UC4-1320 / (UAE.WAO.015/2561) | Technology Promotion Association (Thailand-Japan) | 24TM303 | 10 Feb 24 | 9 Feb 25 | - |
| 7 | BOD Incubator | | Arco | UR-1320 / (UAE.WAO.018/2551) | Technology Promotion Association (Thailand-Japan) | 23TM375 | 12 Apr 23 | 10 Apr 24 | - |
| 8 | Digestor Unit | ทีเคเอ็น (TKN) | FOSS TECATOR | DT2520 / 91794469 | FOSS South East Asia | 9809 | 8 Feb 24 | 7 Feb 25 | - |
| 9 | Distillation Unit (Kjeldahl Method) | | FOSS TECATOR | KT200 / 91790524 | FOSS South East Asia | 9810 | 9 Feb 24 | 7 Feb 25 | |
| 10 | UV-VIS Spectrophotometer | แอมโมเนีย (Ammonia) ไนเตรท (Nitrate) | Agilent Technologies | Cary60 G6860A / MY15410009 | DQE Services Co.,Ltd. | SP23-021 | 20 May 23 | 18 May 24 | - |
| 11 | UV-VIS Spectrophotometer | | Agilent Technologies | Cary60 G6860A / MY15410009 | DQE Services Co.,Ltd. | SP24-018 | 7 May 24 | 6 May 25 | - |

รายการใบรับรองสอบเทียบ/ทวนสอบ เครื่องมือหลักประจำห้องปฏิบัติการวิเคราะห์ สำหรับวิเคราะห์คุณภาพสิ่งแวดล้อม

| No. | Instrument/Equipment | Parameter | Manufacturer | Model/Serial No. | Calibrator | Certification No. | Date of Calibration | Due date of Calibration* | Remark |
|---|----------------------|--|--------------|------------------------|--|-------------------|---------------------|--------------------------|--------|
| เครื่องมือหลักประจำห้องปฏิบัติการวิเคราะห์คุณภาพน้ำ | | | | | | | | | |
| 12 | Incubator | ปริมาณโคลิฟอร์มทั้งหมด (Total Coliform Bacteria) ปริมาณฟิคอลโคลิฟอร์ม (Fecal Coliform Bacteria) | Memmert | IPP 260 / V615.0187 | Technology Promotion Association (Thailand-Japan) | 23TM378 | 12 Apr 23 | 10 Apr 24 | - |
| 13 | Incubator | Escherichia coli Staphylococcus aureus | Memmert | IPP 260 / V615.0187 | Technology Promotion Association (Thailand-Japan) | 24TM648 | 1 Apr 24 | 31 Mar 25 | - |
| 14 | Water Bath | Pseudomonos aeruginosa | Memmert | WNE 14 / L416.0612 | Technology Promotion Association (Thailand-Japan) | 24TM30 | 10 Feb 24 | 8 Feb 25 | - |
| 15 | Auto Clave | | ALP | CL-40L / 810010 | DKSH (Thailand) Ltd. | C11230106 | 9 Jun 23 | 7 Jun 24 | - |
| 16 | Analytical Balance | | OHAUS | PX623 / C236754745 | DKSH (Thailand) Ltd. | C01234158 | 8 Dec 23 | 7 Dec 24 | - |

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



Cert.No.: 24CH39
Page.: 1 of 3

Certificate of Calibration

Equipment : pH Meter
Manufacturer : Horiba
Model : LAQUA-PH210
Serial No. : HA0A0005
ID No. : UAE.EFM.004/2563(EFM.pH.04/63)
Condition As-Received: Used Item
Received Date : 09 January 2024
Calibration Date : 10 January 2024
Reference : 2401-0219WSC-2
Submitted by : United Analyst and Engineering Consultant Co.,Ltd.
3 Soi Udomsuk 41, Sukhumvit Road,
Bangchak, Phrakhanong, Bangkok 10260
Ambient Temperature : (25 ± 2.5) °C
Relative Humidity : (50 ± 15) %
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 Lemgagtrakul

Approved by :
(✓) Sathip Meangmai
() Warakorn Lemgagtrakul
() Ponpan Palpim

Issue Date : 15 January 2024

The Uncertainties are for a confidence probability of approximately 95%

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

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a 0062455



Cert.No.: 24CH39
Page.: 2 of 3

Condition of this calibration result

1. Reference Standard Instrument : -

| Instrument | Serial No. | ID No. | Cert. No. | Due Date |
|--------------------------------|------------|----------|-----------|--------------|
| 1) Document Process Calibrator | 54030049 | 130RC116 | 23E2802 | 27 Aug 2024 |
| 2) Ref. Standard Thermometer | 4982054 | 110RC044 | 23I908 | 26 July 2024 |

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

2. Certified Reference Materials : The measurement results are traceable to SI through CPA chem Ltd.,
ANSI-ASQ National Accreditation Board, Accredited No. AR-1835

| Buffer Solution | Manufacturer | Lot No. | Exp. date |
|-----------------|--------------|---------|-------------|
| pH 4.008 | CPA chem | 940102 | 27 Nov 2025 |
| pH 6.986 | CPA chem | 931959 | 01 Oct 2024 |
| pH 9.997 | CPA chem | 940106 | 02 Nov 2024 |

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

Calibration Results

Function : mV Measurement

Performing standard curve by Fluke at pH (4.7)(7.10)

| Unit Under Calibration | Nominal Value | Standard Voltage Input | Actual Reading | | Uncertainty of Measurement (±mV) | Coverage factor k |
|---------------------------|---------------|------------------------|----------------|-------|---------------------------------------|----------------------|
| | | | mV | pH | | |
| pH Meter S/N: HA0A0005 | 4.00 | 177.48 | 177.4 | 4.01 | 0.058 | 2.00 |
| | 7.00 | 0.00 | 0.1 | 7.00 | 0.058 | 2.00 |
| | 7.00 | 0.00 | 0.1 | 7.00 | 0.058 | 2.00 |
| | 10.00 | -177.48 | -177.2 | 10.01 | 0.058 | 2.00 |

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Cert.No.: 24CH39
Page.: 3 of 3

Calibration Results

Function : pH Measurement

Performing three buffers standard curve by using buffer nominal pH (4.7)(7.10)

| Unit Under Calibration | Standard pH Buffer Solution | Actual pH Reading | Actual mV Reading (mV) | Uncertainty of pH measurement (±) | Coverage factor k |
|-------------------------------|-----------------------------|-------------------|--------------------------|-------------------------------------|-------------------|
| pH Electrode S/N: 991L0051 | 4.008 | 4.02 | 155.5 | 0.0085 | 2.05 |
| | 6.986 | 7.00 | -18.4 | 0.0093 | 2.00 |
| | 6.986 | 7.00 | -18.2 | 0.011 | 2.00 |
| | 9.997 | 10.01 | -189.0 | 0.0096 | 2.00 |

Function : Temperature Measurement

(°) Without adjustment

This equipment was connected with Temperature Probe;

- Model : 9652
- Serial No. : 991L0051

Dimension of probe;

- Length : 103 mm
- Diameter : 16 mm
- Immersion Depth : 90 mm

| Calibration Point (°C) | Standard Temperature (°C) | UUC* Reading (°C) | Error (°C) | Uncertainty of measurement (± °C) | Coverage factor k |
|--------------------------|-----------------------------|---------------------|--------------|-------------------------------------|-------------------|
| 25.0 | 25.002 | 25.0 | -0.002 | 0.13 | 2.00 |
| 30.0 | 30.002 | 30.0 | -0.002 | 0.13 | 2.00 |
| 35.0 | 35.003 | 34.9 | -0.103 | 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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Certificate of Calibration

Equipment: pH METER
Model: SevenEasy
Serial No. (or ID.): 1230525212 (UAE.WAS.003/2553)
Manufacturer: METTLER TOLEDO
Electrode Serial No.: 1156883
Condition: In Condition
Certificate No.: C07240167
Issued Date: 9 April 2024
Job No.: WO-00024208
Page: 1 of 3
Model: InLab Solids Brand: METTLER TOLEDO

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

Environment Condition: Temperature 23 °C ± 2 °C
Humidity 50 %RH ± 15 %RH

Calibration Place: Environment Laboratory, DKSH Technology Limited.
2533 Sukhumvit Road, Bangchak,
Phrakhanong, Bangkok 10260 Thailand

Calibration By:

Calibration Date: 9 April 2024

The Method used: In house method, CAL-WI-58, base on ASTM E 70-07

Traceability: This certificate is traceable to SI Units, Sample Test is assured through primary measurement method Harned cell, through CPAchem Ltd. (ISO/IEC 17034) Certificate No. 938377, 931985, 931984 And pH Scale traceable to the SI Units maintained by National Institute of Metrology (NIMT), Thailand through Industrial Foundation Electrical and Electronics Institute Certificate No. CA20230350EA

Person in charge

Authorized signatory

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

Calibration Results:

pH Scale

| Input (mV) | pH Meter Reading | | | Uncertainty of Measurement (mV) | Coverage Factor (k) |
|---------------|------------------|------------|-------|------------------------------------|---------------------|
| | (mV) | Error (mV) | (pH) | | |
| 414.12 | 414 | -0.12 | 0.00 | 0.58 | 2.00 |
| 354.96 | 355 | 0.04 | 1.00 | 0.58 | 2.00 |
| 295.8 | 296 | 0.20 | 2.00 | 0.58 | 2.00 |
| 236.64 | 237 | 0.36 | 3.00 | 0.58 | 2.00 |
| 177.48 | 178 | 0.52 | 4.00 | 0.58 | 2.00 |
| 118.32 | 118 | -0.32 | 5.00 | 0.58 | 2.00 |
| 59.16 | 59 | -0.16 | 6.00 | 0.58 | 2.00 |
| 0 | 0 | 0.00 | 7.00 | 0.58 | 2.00 |
| -59.16 | -59 | 0.16 | 8.00 | 0.58 | 2.00 |
| -118.32 | -118 | 0.32 | 9.00 | 0.58 | 2.00 |
| -177.48 | -177 | 0.48 | 10.00 | 0.58 | 2.00 |
| -236.64 | -236 | 0.64 | 11.00 | 0.58 | 2.00 |
| -295.8 | -296 | -0.20 | 12.00 | 0.58 | 2.00 |
| -354.96 | -355 | -0.04 | 13.00 | 0.58 | 2.00 |
| -414.12 | -414 | 0.12 | 14.00 | 0.58 | 2.00 |

Practical slope and zero point*

The three-point calibration using three standard buffer solutions; pH 4.008 , pH 6.985 and pH 9.997

-During calibration, display of pH meter reading; pH 4.00 , pH 7.00 and pH 10.01

The practical slope of the pH electrode; 57.01 (mV/pH), 96.37%

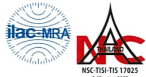
The zero point of the pH electrode; 6.88 (pH)

Sample Test Results

| Standard Buffer Solution (pH) | Unit Under Calibration (pH) | Difference (pH) | Uncertainty of Measurement (pH) | Coverage Factor (k) |
|----------------------------------|--------------------------------|-----------------|------------------------------------|---------------------|
| 4.008 | 3.99 | -0.018 | 0.0070 | 2.00 |
| 6.985 | 7.00 | 0.015 | 0.0091 | 2.00 |
| 9.997 | 10.02 | 0.023 | 0.0074 | 2.00 |

* Calibration Marked " Not TISI Accredited " in this Certificate have been included for completeness.

The End of Certificate



Certificate of Calibration

Equipment: Digital Thermometer with Probe
Model: SevenEasy pH
Serial No.: 1230525212
Manufacturer: METTLER TOLEDO
ID No.: UAE.WAS.003/2553

Certificate No.: C15240373
Issued Date: 09 April 2024
Job No.: WO-00024208
Page: 1 of 2
Condition: In Condition

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

Environment Condition: Temperature: 22 °C ± 3 °C
Humidity: 50 %RH ± 20 %RH
Voltage: 220 VAC ± 10 %

Calibration Place: Thermo-Hygro Laboratory, DKSH Technology Limited.
2533 Sukhumvit Road, Bangkok,
Prakanong, Bangkok 10260 Thailand

Calibration By: [Signature]
Calibration Date: 09 April 2024
The Method used: In house method, CAL-WI-19, by comparison with standard thermometer
Traceability: This certificate is traceable to the International System of Unit maintained by
Quality Reborn Co.,Ltd. (QR) Certificate No. QR23-1073

Person in charge

Authorized signatory

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

Reference standard equipment:

| Equipment | Certificate no | Cal. date | Next Cal. date |
|--------------------------------|----------------|-----------|----------------|
| Digital Thermometer with Probe | QR23-1073 | 2 May 23 | 2 May 24 |

Calibration Results:

Without Adjustment

Sensor Type: RTD

Channel: -

Diameter (mm) 4

Length (mm): 135

Immersion (mm): 110

| Calibrate Point (°C) | STD. Reading (°C) | UUC. Reading (°C) | Correction of UUC (°C) | Uncertainty (± °C) |
|----------------------|-------------------|-------------------|------------------------|--------------------|
| 15.0 | 15.010 | 15.1 | -0.090 | 0.076 |
| 25.0 | 25.006 | 25.1 | -0.094 | 0.076 |
| 35.0 | 35.004 | 35.0 | 0.004 | 0.076 |

The End of Certificate

Calibration Certificate

Certificate No.: 2303560-001-01
Client name: UNITED ANALYST AND ENGINEERING CONSULTANT CO., LTD.
Address: 3 Soi Udomsuk 41, Sukhumvit Road,
Bangchack, Prakanong, Bangkok 10260

Page 1 of 5

Equipment: pH Meter
Manufacturer: Mettler Toledo
Model: Seven Compact S220
Serial No.: C113432421
ID No.: UAE.WAT.009/2564
Order No.: 2303560
Operation No.: 2303560-001
Date of Receipt: 23 June 2023
Date of Calibration: 26 June 2023

Calibrated by  **Approved by** 
Scientist Manager, Division of Calibration Laboratory
Responsible for the Technical Management Team

Date of Issue: 27 June 2023

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

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

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

2008 ถนนสุขุมวิท 35 แขวงคลองตันใต้ เขตคลองเตย กรุงเทพมหานคร 10710
2008 Soi 35, Asoi Asoi Road, Bang Yi Khan Subdistrict, Bang Phai District, Bangkok 10710, Thailand
Tel: +66(0) 2422 8588 Fax: +66(0) 2422 8545



Calibration Report

Certificate No.: 2303560-001-01
Equipment: pH Meter
Resolution: 0.01 pH : 1 mV
Manufacturer: Mettler Toledo
Model: Seven Compact S220
Serial No.: C113432421
ID No.: UAE.WAT.009/2564
Type: Bench top

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Date of Calibration: 26 June 2023
Location: Chemical Calibration Laboratory, National Food Institute
Environment Condition: Ambient Temperature: (24.3 ± 1.5) °C Relative Humidity: (49 ± 3) %
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 23E2003 14 June 2024
2.2 Digital Thermometer 2709007 Fluke CC-650557-01 30 October 2023
2.3 Thermo-Hygro Meter NFLBTH003/17 PONPE TE 650555-01 21 September 2023
Certified Reference Material Lot No. Manufacturer Ref N Expire Date
2.4 pH buffer 4.008 (Primary pH buffer Solution) 873608 CPAchem PH216.L5 16 February 2025
2.5 pH buffer 7.00 (Standard pH buffer Solution) 873612 CPAchem PH107.L5 16 February 2024
2.6 pH buffer 10.01 (Primary pH buffer Solution) 873611 CPAchem PH220.L5 16 February 2024
2.7 pH buffer 6.865 (Primary pH buffer Solution) 873609 CPAchem PH217.L5 16 February 2025
3. This certification is traceable to The International System of Unit (SI Unit)
3.1 Instruments No.2.1 through NSC-TIS-TIS 17025 Laboratory Accreditation of Calibration No.008
3.2 Instruments No.2.2 through NSC-TIS-TIS 17025 Laboratory Accreditation of Calibration No.0061
3.3 Instruments No.2.3 through NSC-TIS-TIS 17025 Laboratory Accreditation of Calibration No.0061
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-13 LoIN 25.05.2022; BIM RefN HI-16 LoIN 02.06.2022; BIM RefN HI-13 LoIN 25.05.2022; BIM RefN HI-16 LoIN 02.06.2022, the Standard Solution preparation and certified by CPAchem Ltd is accredited to ISO 17034 and ISO/IEC 17025
4. This certificate was certified only for the instrument we calibrated.
5. This result of calibration was found accurate as shown on date and place of calibration only.

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

2008 ถนนสุขุมวิท 35 แขวงคลองตันใต้ เขตคลองเตย กรุงเทพมหานคร 10710
2008 Soi 35, Asoi Asoi Road, Bang Yi Khan Subdistrict, Bang Phai District, Bangkok 10710, Thailand
Tel: +66(0) 2422 8588 Fax: +66(0) 2422 8545



Calibration Report

Certificate No.: 2303560-001-01
Equipment: pH Meter
Resolution: 0.01 pH : 1 mV
Manufacturer: Mettler Toledo
Model: Seven Compact S220
Serial No.: C113432421
ID No.: UAE.WAT.009/2564
Type: Bench top

Date of Calibration: 26 June 2023 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 | 414.121 | 414 | 0.00 | 0.58 | 2.00 |
| 2 | 295.814 | 295 | 2.00 | 0.58 | 2.00 |
| 4 | 177.464 | 177 | 4.00 | 0.58 | 2.00 |
| 6 | 59.160 | 59 | 6.00 | 0.58 | 2.00 |
| 7 | 0.001 | 0 | 7.00 | 0.58 | 2.00 |
| 8 | -59.159 | -59 | 8.00 | 0.58 | 2.00 |
| 10 | -177.461 | -177 | 10.00 | 0.58 | 2.00 |
| 12 | -295.811 | -296 | 12.00 | 0.58 | 2.00 |
| 14 | -414.118 | -414 | 14.00 | 0.58 | 2.00 |

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

Equipment: pH Electrode
Type: Combined Electrode
Manufacturer: Mettler Toledo
Model: InLab Expert Pro-ISM
Serial No.: 3114136
ID No.: N/A

Performance of Electrode system (Three-Point Calibration at pH 4, pH 7 and pH 10)

| Certified Value @25 °C (pH) | Average Indicator Reading | | Relative Slope (%) | Uncertainty (± pH) | Coverage Factor (k) |
|-----------------------------|---------------------------|------|--------------------|--------------------|---------------------|
| | pH | mV | | | |
| 4.008 | 4.01 | 177 | - | 0.0071 | 2.00 |
| 6.865 | 6.90 | 9 | 98.26 | 0.0074 | 2.00 |
| 10.01 | 10.01 | -168 | 96.20 | 0.0085 | 2.00 |
| 6.986 | 7.02 | 3 | - | 0.0093 | 2.00 |

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

2008 ถนนสุขุมวิท 35 แขวงคลองตันใต้ เขตคลองเตย กรุงเทพมหานคร 10710
2008 Soi 35, Asoi Asoi Road, Bang Yi Khan Subdistrict, Bang Phai District, Bangkok 10710, Thailand
Tel: +66(0) 2422 8588 Fax: +66(0) 2422 8545



Calibration Report

Certificate No.: 2303560-001-01
Equipment: Digital Thermometer with RTD (pH Meter)
Resolution: 0.1 °C
Model: Seven Compact S220
Serial No.: C113432421
ID No.: UAE.WAT.009/2564
Manufacturer: Mettler Toledo

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Location: Chemical Calibration Laboratory, National Food Institute
Environment Condition: Ambient Temperature (24.4 ± 1.0) °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 | 1523 | 2933097 | PSL-T 128265 | 03-Nov-23 | TISTR |
| Platinum Resistance Thermometer (PRT) | 5627A | 923972 | | | |

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

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

2008 ถนนสุขุมวิท 35 แขวงคลองตันใต้ เขตคลองเตย กรุงเทพมหานคร 10710
2008 Soi 35, Asoi Asoi Road, Bang Yi Khan Subdistrict, Bang Phai District, Bangkok 10710, Thailand
Tel: +66(0) 2422 8588 Fax: +66(0) 2422 8545



Calibration Report

Certificate No.: 2303000-001-01
Equipment: Digital Thermometer with RTD (pH Meter)
Resolution: 0.1 °C **Model:** Seven Compact S220
Serial No.: C113432421 **ID No.:** UAE.WAT.009/2564
Manufacturer: Mettler Toledo

Date of Calibration: 26 June 2023 Page 5 of 5

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

- The probe was immersed in liquid bath or dry bath to a minimum depth of 100 mm.
- Description of probe, model : HI11310 S/N : 078743
Dimension of probe : Diameter 12 mm., Length 175 mm.,
Sheath material : Plastic


| UUC* Reading (°C) | Standard Temperature (°C) | Correction Value (°C) | Uncertainty ± (°C) |
|-------------------|---------------------------|-----------------------|--------------------|
| 15.0 | 15.003 | 0.0 | 0.099 |
| 24.9 | 25.005 | 0.1 | 0.099 |
| 34.9 | 35.005 | 0.1 | 0.099 |

Note - UUC* : Unit Under Calibration

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

----- End -----

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

2008 ซอย 35, อวน อมรินทร์ ถนน, แขวงบางพลี กรุงเทพมหานคร 10700 **เอกสารไม่ควบคุม**
2008 Soi 35, Aun Amarin Road, Bang Yi Khan Subdistrict, Bang Phli District, Bangkok 10700, Thailand
Tel: +66(0) 2422 8688 Fax: +66(0) 2422 8545 

Calibration Certificate

Certificate No.: 2402283-002-01
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: XSR205DU

Serial No.: C210685394

ID No.: UAE.WAO.010/2565

Order No.: 2402283

Operation No.: 2402283-002

Date of Receipt: 2 April 2024

Date of Calibration: 2 April 2024

Calibrated by  **Scientist**


Approved by  **Manager, Division of Calibration Laboratory**
Responsible for the Technical Management Team

Date of Issue: 9 April 2024

The uncertainties are for a confidence probability of approximately 95%

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

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

2008 ซอย 35, อวน อมรินทร์ ถนน, แขวงบางพลี กรุงเทพมหานคร **เอกสารไม่ควบคุม**
2008 Soi 35, Aun Amarin Road, Bang Yi Khan Subdistrict, Bang Phli District, Bangkok 10700, Thailand
Tel: +66(0) 2422 8688 Fax: +66(0) 2422 8545 

Calibration Report

Certificate No.: 2402283-002-01
Equipment: Electronic Balance
Model: XSR205DU
Serial No.: C210685394
Capacity: 220 g
Manufacturer: METTLER TOLEDO
Resolution: 0.00001 g / 0.0001 g
ID No.: UAE.WAO.010/2565

Date of Calibration: 2 April 2024 Page 2 of 4

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

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

Condition of Equipment: Good Condition

Condition of This Results of Calibration:

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

2. Reference Standards:

| Reference Standard | Model | Serial No. | Calibrated By | Certificate No. | Due Date |
|--------------------------|-------------|----------------|----------------|-----------------|-----------------|
| Standard Weight Class E2 | 1mg to 200g | B50556752 | TCS | M23040535 | 8 April 2024 |
| Instrument | Model | Serial No. | Calibrated By | Certificate No. | Due Date |
| Thermo-Hygro Meter | 608-H1 | NFI.BTH 016/23 | Quality Reborn | QR24-0343 | 9 February 2025 |

3. This certification is traceable to SI UNIT

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

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

Calibration Results:




1. Repeatability of Reading:

| Nominal Value (g) | Standard Deviation of Reading (g) |
|---------------------|-------------------------------------|
| 40 | 0.000042 |
| 80 | 0.000052 |
| 100 | 0.000048 |
| 200 | 0.000048 |


2. Off-Center Error:

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

The balance reading obtained is given in the table.

| | | |
|---|---|---|
|  |  |  |
| 1 | 2 | 3 |
| (g) | (g) | (g) |
| 100.0000 | 100.0001 | 99.9999 |
| 4 | 5 | 6 |
| (g) | (g) | (g) |
| 100.0000 | 100.0001 | 100.0000 |
| (Maximum Difference) | | |
| 0.0001 | | |

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

2008 ซอย 35, อวน อมรินทร์ ถนน, แขวงบางพลี กรุงเทพมหานคร **เอกสารไม่ควบคุม**
2008 Soi 35, Aun Amarin Road, Bang Yi Khan Subdistrict, Bang Phli District, Bangkok 10700, Thailand
Tel: +66(0) 2422 8688 Fax: +66(0) 2422 8545 

Calibration Report

Certificate No.: 2402283-002-01
Equipment: Electronic Balance
Model: XSR205DU
Serial No.: C210685394
Capacity: 220 g
Manufacturer: METTLER TOLEDO
Resolution: 0.00001 g / 0.0001 g
ID No.: UAE.WAO.010/2565

Date of Calibration: 2 April 2024 Page 3 of 4

Calibration Results: (Continued)


Calibration Range: 0 - 80 g

Calibration Adjustment: Internal Calibration

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

| Nominal Value (g) | Standard Value (g) | Average Reading (g) | Correction (g) | Uncertainty (± g) | Coverage Factor |
|---------------------|----------------------|-----------------------|------------------|---------------------|-----------------|
| Unloaded | 0.000000 | 0.000000 | 0.000000 | 0.0000086 | 2.00 |
| 0.001 | 0.001003 | 0.001011 | -0.000011 | 0.0000089 | 2.00 |
| 0.005 | 0.005003 | 0.005000 | 0.000003 | 0.0000092 | 2.00 |
| 0.01 | 0.010003 | 0.010000 | 0.000003 | 0.0000089 | 2.00 |
| 0.05 | 0.049996 | 0.050000 | 0.000004 | 0.0000096 | 2.00 |
| 0.1 | 0.100011 | 0.100000 | 0.000011 | 0.0000114 | 2.00 |
| 0.5 | 0.500016 | 0.500001 | 0.000015 | 0.000014 | 2.00 |
| 1 | 1.000003 | 1.000002 | -0.000002 | 0.000016 | 2.00 |
| 2 | 2.000023 | 2.000001 | 0.000022 | 0.000017 | 2.00 |
| 5 | 5.000017 | 5.000002 | 0.000015 | 0.000020 | 2.00 |
| 10 | 10.000009 | 10.000000 | 0.000009 | 0.000026 | 2.00 |
| 20 | 20.000031 | 20.000000 | 0.000031 | 0.000037 | 2.00 |
| 30 | 30.000040 | 30.000001 | 0.000039 | 0.000050 | 2.00 |
| 50 | 50.000028 | 50.000002 | 0.000026 | 0.000068 | 2.00 |
| 80 | 80.000068 | 80.000002 | 0.000066 | 0.000111 | 2.00 |

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

2008 ซอย 35, อวน อมรินทร์ ถนน, แขวงบางพลี กรุงเทพมหานคร **เอกสารไม่ควบคุม**
2008 Soi 35, Aun Amarin Road, Bang Yi Khan Subdistrict, Bang Phli District, Bangkok 10700, Thailand
Tel: +66(0) 2422 8688 Fax: +66(0) 2422 8545 

Calibration Report

Certificate No.: 2402283-002-01
Equipment: Electronic Balance
Manufacturer: METTLER TOLEDO
Model: XSR205DU
Resolution: 0.0001 g / 0.0001 g
Serial No.: C210685394
ID No.: UAE.WAO.010/2565
Capacity: 220 g

Date of Calibration: 2 April 2024

Page 4 of 4

Calibration Results: (Continued)

Calibration Range: 81 - 200 g

Calibration Adjustment: Internal Calibration

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

| Nominal Value (g) | Standard Value (g) | Average Reading (g) | Correction (g) | Uncertainty (± g) | Coverage Factor k |
|----------------------|-----------------------|------------------------|-------------------|----------------------|----------------------|
| 90 | 90.00010 | 90.0001 | 0.0000 | 0.00015 | 2.00 |
| 100 | 100.00006 | 100.0001 | 0.0000 | 0.00015 | 2.00 |
| 110 | 110.00007 | 110.0001 | 0.0000 | 0.00016 | 2.00 |
| 120 | 120.00009 | 120.0000 | 0.0001 | 0.00017 | 2.00 |
| 130 | 130.00010 | 130.0000 | 0.0001 | 0.00019 | 2.00 |
| 140 | 140.00014 | 140.0000 | 0.0001 | 0.00020 | 2.00 |
| 150 | 150.00009 | 150.0001 | 0.0000 | 0.00020 | 2.00 |
| 160 | 160.00010 | 160.0001 | 0.0000 | 0.00022 | 2.00 |
| 170 | 170.00012 | 170.0001 | 0.0000 | 0.00023 | 2.00 |
| 200 | 200.00016 | 200.0002 | 0.0000 | 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 -----

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

2008 เวทีประชุมระดับ 35 (มูลนิธิพัฒนาอาหาร) กรุงเทพมหานคร อาคาร 10 ชั้น ถนนวิภาวดีรังสิต แขวงวิภาวดี กรุงเทพมหานคร 10710
2008 Soi 35, Anur Achin Road, Bang Yi Khan Subdistrict, Bang Phlat District, Bangkok 10710, Thailand
Tel: +66(0) 2422 8588 Fax: +66(0) 2422 8545



Calibration Certificate

Certificate No.: 2400141-001-01
Client name: UNITED ANALYST AND ENGINEERING CONSULTANT CO.,LTD.
Address: 3 Soi Udomsak 41, Sukhumvit Road,
Bangchack, Prakanong, Bangkok 10260

Page 1 of 3

Equipment: CHAMBER (Hot Air Oven)

Manufacturer: MEMMERT

Model: UF 55

Serial No.: B216.1666

ID No.: UAE.WAO.027/2559

Order No.: 2400141

Operation No.: 2400141-001

Date of Receipt: 11 October 2023

Date of Calibration: 11 October 2023

Calibrated by

Scientist

Approved by

Manager, Division of Calibration Laboratory

Date of Issue: 16 October 2023

Responsible for the Technical Management Team

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

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

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

2008 เวทีประชุมระดับ 35 (มูลนิธิพัฒนาอาหาร) กรุงเทพมหานคร อาคาร 10 ชั้น ถนนวิภาวดีรังสิต แขวงวิภาวดี กรุงเทพมหานคร 10710
2008 Soi 35, Anur Achin Road, Bang Yi Khan Subdistrict, Bang Phlat District, Bangkok 10710, Thailand
Tel: +66(0) 2422 8588 Fax: +66(0) 2422 8545



Calibration Report

Certificate No.: 2400141-001-01
Equipment: CHAMBER (Hot Air Oven)
Model: UF 55
Serial No.: B216.1666
Resolution: 0.1 °C
ID No.: UAE.WAO.027/2559
Manufacturer: MEMMERT

Date of Calibration: 11 October 2023

Page 2 of 3

Location: Laboratory, Floor 2, UNITED ANALYST AND ENGINEERING CONSULTANT CO.,LTD.

Environment Condition:
Ambient Temperature (28 ± 1) °C
Relative Humidity (63 ± 2) %
Line Voltage (228 ± 1) Volt

Condition of this results of Calibration:

1. This instrument was calibrated by insert 9 standard thermometer into its chamber and calibration according to W-TE-014 Based on TLAS G-20-1/02-08 (E): Guidelines for Calibration and Checks of Temperature Controlled Enclosures.

- 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./ID No. | Certificate No. | Due Date | Through |
|---------------------------------|--------|------------------------|-----------------|---------------|-------------------------|
| Digital Thermometer with sensor | 34972A | MY49016894 | TE 660380-01 | 22 April 2024 | NATIONAL FOOD INSTITUTE |
| | RTD | CH#201-209/RTD#201-209 | | | |

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

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

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

6. Condition of Calibrated item : Good

UUC Description :

Time of Record 1 Hour 9 Minute At 104.0, 140.0 and 180.0 °C
Fresh air Damper ☒ Open Position ☐
☒ Close
☒ Not Available

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

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

2008 เวทีประชุมระดับ 35 (มูลนิธิพัฒนาอาหาร) กรุงเทพมหานคร อาคาร 10 ชั้น ถนนวิภาวดีรังสิต แขวงวิภาวดี กรุงเทพมหานคร 10710
2008 Soi 35, Anur Achin Road, Bang Yi Khan Subdistrict, Bang Phlat District, Bangkok 10710, Thailand
Tel: +66(0) 2422 8588 Fax: +66(0) 2422 8545



Calibration Report

Certificate No.: 2400141-001-01
Equipment: CHAMBER (Hot Air Oven)
Model: UF 55
Serial No.: B216.1666
Resolution: 0.1 °C
ID No.: UAE.WAO.027/2559
Manufacturer: MEMMERT

Date of Calibration: 11 October 2023

Page 3 of 3

Calibration point: 104.0, 140.0 and 180.0 °C

Calibration result:

| Calibration Condition | Temperature (°C) | Relative Humidity (%) | Line Voltage (Volt) |
|-----------------------|------------------|-----------------------|---------------------|
| MIN | 28.2 | 61.4 | 227.4 |
| MAX | 28.3 | 65.1 | 229.3 |

Table 1 : Reporting of Temperature

| Calibration point (°C) | Measured Temperature (°C) @ Sensor No. (Sensor No.9 is REF) | | | | | | | | | Uncertainty ± (°C) |
|------------------------|---|--------|--------|--------|--------|--------|--------|--------|--------|--------------------|
| | # 1 | # 2 | # 3 | # 4 | # 5 | # 6 | # 7 | # 8 | # 9 | |
| 104.0 | 104.05 | 103.98 | 104.02 | 104.08 | 104.00 | 104.05 | 103.99 | 104.17 | 104.00 | 0.53 |
| 140.0 | 140.09 | 139.99 | 139.91 | 140.05 | 139.99 | 139.91 | 139.97 | 140.26 | 139.97 | 0.73 |
| 180.0 | 180.46 | 180.33 | 180.25 | 180.28 | 180.33 | 179.96 | 180.31 | 180.64 | 180.16 | 0.90 |

Table 2 : Reporting of Characterization Result

| UUC* Setting (°C) | UUC* reading (°C) | | | Stability ± (°C) | Uniformity (°C) | Overall Variation (°C) |
|-------------------|-------------------|-------|---------|------------------|-----------------|------------------------|
| | MIN | MAX | Average | | | |
| 104.0 | 104.0 | 104.0 | 104.0 | 0.090 | 0.18 | 0.38 |
| 140.0 | 140.0 | 140.1 | 140.0 | 0.075 | 0.28 | 0.47 |
| 180.0 | 180.0 | 180.1 | 180.0 | 0.13 | 0.48 | 0.88 |

Note The quoted uncertainty include "Stability" and "Loading effect (20% of Temp Uniformity)"

UUC* = Unit Under Calibration

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

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.

Overall Variation = The difference of the maximum and minimum measured temperatures throughout observation time.

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

----- End -----

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

2008 เวทีประชุมระดับ 35 (มูลนิธิพัฒนาอาหาร) กรุงเทพมหานคร อาคาร 10 ชั้น ถนนวิภาวดีรังสิต แขวงวิภาวดี กรุงเทพมหานคร 10710
2008 Soi 35, Anur Achin Road, Bang Yi Khan Subdistrict, Bang Phlat District, Bangkok 10710, Thailand
Tel: +66(0) 2422 8588 Fax: +66(0) 2422 8545





Certificate of Calibration

Cert.No.: 24MM293
Page: 1 of 3

Equipment : Electronic Balance
Manufacturer : Mettler Toledo
Model : XSR204
Serial No. : C117635043
ID No. : UAE.WAS.012/2564
Submitted by : United Analyst and Engineering Consultant Co.,Ltd.
3 Soi Udomsuk 41, Sukhumvit Road,
Bangchak, Phrakhanong,
Bangkok 10260
Location : Balance Room (108)
Received order : 11 May 2024
Calibration Date : 11 May 2024
Ambient Temperature : 15 °C to 40 °C
Relative Humidity : 30 % to 90 %
Calibrated by : Khit Rutnanapachai
Approved by :
()
()
(✓)
Issue Date : 15 May 2024

The Uncertainties are for a confidence probability of approximately 95%

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

เอกสารไม่ควบคุม



Equipment : Electronic Balance
Condition As-Received : Used Item
Reference : 2405-0166OC-2
Procedure used :-

Cert.No.: 24MM293
Page: 2 of 3

Calibration were conducted using in-house calibration procedure CP-OB01 based on UKAS LAB 14
according to direct measurement method against standard weight.

Condition of this result of calibration

1. Reference standard instruments:-

| Instruments | Model | Serial No. | ID No. | Test report No. | Due date |
|--|-------|------------|---------|-----------------|-------------|
| 1) Standard Weight Set (E2) | 15884 | 24053 | 70RC007 | MM-0013-24 | 25 Jan 2026 |
| 2. This certificate is valid only to the item calibrated on date and place of calibration. | | | | | |
| 3. This result of calibration was made on requested at the point specified by customer. | | | | | |
| 4. This certificate is not certified for any commercial transaction. | | | | | |
| 5. This certification is traceable to the International System of Unit. | | | | | |

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

Range capacity : 0 g to 220 g Resolution 0.0001 g

Before Adjustment :

| Applied Weight (g) | Balance Reading (g) | Correction (g) | Measurement Uncertainty (± mg) | Coverage Factor (k) |
|-------------------------|-----------------------------|---------------------|--|-----------------------------|
| 100 | 100.0000 | 0.0000 | 0.27 | 2.03 |
| 200 | 200.0001 | -0.0001 | 0.31 | 2 |

After Adjustment :

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

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

เอกสารไม่ควบคุม



Equipment : Electronic Balance
Condition As-Received : Used Item
Reference : 2405-0166OC-2

Cert.No.: 24MM293
Page: 3 of 3

Result of calibration

2. Effect of off center loading

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

| Position 1 (g) | Position 2 (g) | Position 3 (g) | Position 4 (g) | Position 5 (g) | Maximum difference between off-center and central loading (g) |
|---------------------|---------------------|---------------------|---------------------|---------------------|---|
| +0.0002 | -0.0001 | 0.0000 | +0.0002 | 0.0000 | 0.0003 |

3. Departure from nominal value

| Applied Weight (g) | Balance Reading (g) | Correction (g) | Measurement Uncertainty (± mg) | Coverage Factor (k) |
|-------------------------|-----------------------------|---------------------|--|-----------------------------|
| Unload | 0.0000 | 0.0000 | 0.15 | 2.13 |
| 1 | 1.0000 | 0.0000 | 0.15 | 2.13 |
| 5 | 5.0000 | 0.0000 | 0.15 | 2.13 |
| 10 | 10.0000 | 0.0000 | 0.15 | 2.11 |
| 20 | 20.0000 | -0.0000 | 0.19 | 2.03 |
| 50 | 50.0001 | -0.0001 | 0.19 | 2.06 |
| 60 | 60.0001 | -0.0001 | 0.19 | 2.04 |
| 80 | 80.0001 | -0.0001 | 0.27 | 2 |
| 100 | 100.0002 | -0.0002 | 0.27 | 2.03 |
| 120 | 120.0001 | -0.0001 | 0.29 | 2 |
| 200 | 200.0001 | -0.0001 | 0.31 | 2 |

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

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เอกสารไม่ควบคุม



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

Certificate of Calibration

Equipment : BOD Incubator
Manufacturer : Arco
Model : UC4-1320
Serial No. : 13URC4S013201
ID No. : UAE.WAO.015/2561
Submitted by : United Analyst and Engineering Consultant Co.,Ltd.
3 Soi Udomsuk 41, Sukhumvit Road,
Bangchak, Phrakhanong,
Bangkok 10260
Location : Lab Floor 2
Received Order : 10 February 2024
Calibration Date : 10 February 2024
Ambient Temperature : (26 ± 10) °C
Relative Humidity : (50 ± 30) %
Calibrated by : Tawatchai Pama
Approved by :
()
(✓)
()

Issue Date : 19 February 2024

The Uncertainties are for a confidence probability of approximately 95%

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

เอกสารไม่ควบคุม



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

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

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

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

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

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

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

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

UUC* : Unit Under Calibration

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

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

-000-

เอกสาร



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

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

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

Condition of this result of calibration

1. Reference standard instrument:-

| Instrument | Serial No. | Cert. No. | Traceable | Due Date |
|----------------------|------------|-----------|-----------|-------------|
| 1) Data Acquisition | MY59003411 | 23LM208 | TPA | 27 Dec 2024 |

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

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

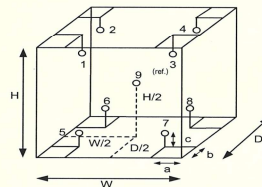
Remark : TPA : Technology Promotion Association (Thailand - Japan)

Result of Calibration :- (*) Without Adjustment

Function of UUC* : Temperature Source

Fresh air setting : Not Available

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



Probe Installation Details :

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

Dimension of Chamber :

D = 0.62 m
W = 1.2 m
H = 1.2 m
Capacity = 0.89 m³

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

เอกสาร



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



Cert. No.: 23TM375
Page : 1 of 3

Certificate of Calibration

Equipment : BOD Incubator
Manufacturer : ARCO
Model : UR-1320
Serial No. : -
ID No. : UAE.WAO.018/2551
Submitted by : United Analyst and Engineering Consultant Co.,Ltd.
3 Soi Udomsuk 41, Sukhumvit Road,
Bangchak, Phrakhanong,
Bangkok 10260
Location : Lab Floor 2
Received Order : 11 April 2023
Calibration Date : 12 April 2023
Ambient Temperature : (26 ± 10) °C
Relative Humidity : (50 ± 30) %
Calibrated by : Krisda Malee

Approved by :
Approved Signatory

Issue Date : 24 April 2023

The Uncertainties are for a confidence probability of approximately 95%

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

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A 0053360



Equipment : BOD Incubator
Condition As-Received : Used Item
Reference : 2304-0156OC-2
Procedure Used :-

Cert. No.: 23TM375
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 | 34972A | MY59003411 | 22LM165 | 26 Nov 2023 |

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

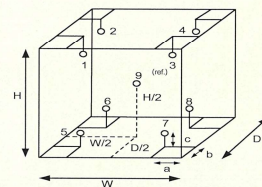
3. This certification is traceable to the International System of Unit.

Result of Calibration :- (*) Without Adjustment

Function of UUC* : Temperature Source

Fresh air setting : Not Available

| Environment during calibration | | |
|--------------------------------|-----------|----------|
| | Beginning | Finished |
| Temp. (°C) | 28 | 27 |
| REL.Humid. (%) | 42 | 45 |
| AC Supply (Volt) | 219 | 220 |



Probe Installation Details :

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

Dimension of Chamber :

D = 0.62 m
W = 1.2 m
H = 1.2 m
Capacity = 0.89 m³

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

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A 1136239



Equipment : BOD Incubator
 Condition As-Received : Used Item
 Reference : 2304-01560C-2
 Result of Calibration : (*) Without Adjustment
 Function of UUC* : Temperature Source
 Fresh air setting : Not Available

Cert. No.: 23TM375
 Page : 3 of 3

| Calibration Point (°C) | UUC* Setting (°C) | UUC* Reading (°C) | Temperature stability (± °C) | Temperature uniformity (°C) | Overall Variation (°C) | Coverage Factor k |
|------------------------|-------------------|-------------------|------------------------------|-----------------------------|------------------------|-------------------|
| 20.0 | 20.0 | 20.0 | 0.48 | 0.42 | 1.2 | 2 |

| Calibration Point (°C) | Measured Temperature (°C) | | | | | | | | | Uncertainty (± °C) |
|------------------------|---------------------------|--------|--------|--------|--------|--------|--------|--------|----------|--------------------|
| | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 (ref.) | |
| 20.0 | 20.040 | 20.170 | 20.263 | 20.093 | 19.749 | 19.704 | 19.920 | 20.191 | 20.020 | 0.66 |

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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FOSS

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

Customer Service Report

Report No: 9809

Date: 8 Feb 2024
 Customer: UAE
 Instrument: DT2520

Address: BANGKOK
 Serial: 91794469

| Hours | Travel To Customer | Labour | Travel From Customer |
|--------|--------------------|--------|----------------------|
| Start | 08:00 | 14:00 | 16:00 |
| Finish | 09:30 | 2 hrs | 18:00 |

| Application | Special | Standard |
|-----------------|----------------|--------------|
| Normal | Courtesy Visit | Installation |
| Distributor | PMA Onboarding | Quote |
| Internal | Warranty | Repair |
| Digital Service | Sales Support | Remote |

PO/Quote Number: If applicable

PMA Type: FOSScare If applicable Contract No. If applicable

| Details of Work / Test | Condition / Status |
|------------------------------------|-------------------------------|
| # PM DT2520 | |
| - ตรวจสอบ connection | |
| - ตรวจสอบ cable kit, temp cut out | |
| - ตรวจสอบ meter 0.42 | |
| - 30°C - 10.0°C = 10 min | |
| - 20.0°C - 42.0°C = 37 min | |
| - Instrument 91794469 meter = 9179 | |
| Instrument Ready for Use | OK Not OK If not OK - Comment |

| Part No. | Batch | Description | Qty |
|----------|------------|---------------------|-----|
| 60079652 | 23.09.2023 | Cable kit digester | 1 |
| 10013654 | 18.01.2020 | Temperature control | |

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

เอกสารไม่ควบคุม

FOSS

Customer Service Report

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

Report No: 9810

Date: 9 Feb 2024
 Customer: UAE
 Instrument: KT200

Address: BANGKOK
 Serial: 91790524

| Hours | Travel To Customer | Labour | Travel From Customer |
|--------|--------------------|--------|----------------------|
| Start | 08:00 | 09:30 | 14:00 |
| Finish | 09:30 | 12:00 | 16:00 |

| Application | Special | Standard |
|-----------------|----------------|--------------|
| Normal | Courtesy Visit | Installation |
| Distributor | PMA Onboarding | Quote |
| Internal | Warranty | Repair |
| Digital Service | Sales Support | Remote |

PO/Quote Number: If applicable

PMA Type: FOSScare If applicable Contract No. If applicable

| Details of Work / Test | Condition / Status |
|--|-------------------------------|
| # PM KT200 | |
| - ตรวจสอบ connection | |
| - ตรวจสอบ cable kit | |
| - ตรวจสอบ meter 0.42 | |
| - 30°C - 10.0°C = 10 min | |
| - 20.0°C - 42.0°C = 37 min | |
| - Instrument 91790524 meter = 9179 | |
| # PM KT200 SMITH Head ตรวจสอบ connection | |
| 10000725 SMITH Head complete 1 PC | |
| Instrument Ready for Use | OK Not OK If not OK - Comment |

| Part No. | Batch | Description | Qty |
|----------|------------|--|-----|
| 10009965 | 14.12.2020 | FOSS PM kit KT200 Leclot Analyser 2100 | 1 |

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

เอกสารไม่ควบคุม

DQE Services Co., Ltd.

32 Soi Ladprao-Wanghin 55, Ladprao-Wanghin Rd., Ladprao, Ladprao, Bangkok 10230
 Phone : +66 (0)2 538 2054, Email : dqeservicesinfo@gmail.com



CERTIFICATE OF CALIBRATION

Certificate No. : SP23-021

Page 1 of 5

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

Address : 3 Soi Udumruk 41, Sukhumvit Road, Bangchak, Phrakhanong,

Bangkok 10260

Location of calibration : Laboratory 315

Equipment : UV-Vis Spectrophotometer

Manufacturer : Agilent Technologies

Model : Cary 60

Serial No. : MY15410009

ID No. : N/A

Received Date : 20 May 2023

Calibration Date : 20 May 2023

Issue Date : 23 May 2023

Condition Instrument : Good

Calibrated by : [Signature] Approved by : [Signature]
 Technical Manager Quality Manager

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


The measurement capability of the laboratory and its traceability to recognized national standards and to the unit of measurement realized at the corresponding national standards laboratory. This certificate may not be reproduced other than in full except with the prior written approval of the DQE Services Co., Ltd.

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



REPORT OF CALIBRATION

Certificate No. : SP23-021Page 2 of 5

Environment Condition : Ambient Temperature 25 ± 5 °C
Relative humidity 55 ± 20 %RH

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

Certified Reference Materials :

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

Traceability This certification is traceable to the International System of Unit maintained at National -
Institute of Standards and Technology (NIST) through Starna Scientific Limited

Spectral Band Width of UUC : 1.5 nm.

Scan Speed of UUC : 60 nm/min

Scan Interval of UUC : 0.15 nm.

Resolution of UUC : Photometric 0.0001 Abs.
Wavelength 0.1 nm.


FM-708-02 R01 1/11/2021

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REPORT OF CALIBRATION

Certificate No. : SP23-021Page 3 of 5

Calibration Results : Without adjustment

Photometric Accuracy :

| Wavelength (nm.) | CRMs Values (Abs) | UUC Reading (Abs) | Correction (Abs) | Uncertainty (Abs) | Coverage factor k |
|------------------|-------------------|-------------------|------------------|-------------------|-------------------|
| 420 | 0.0000 | 0.0000 | 0.0000 | 0.0028 | 2.00 |
| | 0.5787 | 0.5742 | 0.0045 | 0.0031 | 2.00 |
| | 1.0490 | 1.0423 | 0.0067 | 0.0029 | 2.00 |
| | 2.1900 | 2.1847 | 0.0053 | 0.0075 | 2.00 |
| 440 | 0.0000 | 0.0000 | 0.0000 | 0.0028 | 2.00 |
| | 0.5607 | 0.5577 | 0.0030 | 0.0034 | 2.00 |
| | 1.0247 | 1.0234 | 0.0013 | 0.0035 | 2.00 |
| | 2.1229 | 2.1171 | 0.0058 | 0.0088 | 2.00 |
| 465 | 0.0000 | 0.0000 | 0.0000 | 0.0028 | 2.00 |
| | 0.5236 | 0.5184 | 0.0052 | 0.0029 | 2.00 |
| | 0.9634 | 0.9607 | 0.0027 | 0.0029 | 2.00 |
| | 1.9763 | 1.9715 | 0.0048 | 0.0081 | 2.00 |
| 546.1 | 0.0000 | -0.0001 | 0.0001 | 0.0028 | 2.00 |
| | 0.5191 | 0.5159 | 0.0032 | 0.0031 | 2.00 |
| | 1.0003 | 0.9980 | 0.0023 | 0.0033 | 2.00 |
| | 1.9987 | 1.9917 | 0.0070 | 0.0087 | 2.00 |
| 590 | 0.0000 | 0.0000 | 0.0000 | 0.0028 | 2.00 |
| | 0.5523 | 0.5501 | 0.0022 | 0.0030 | 2.00 |
| | 1.0809 | 1.0808 | 0.0001 | 0.0030 | 2.00 |
| | 2.0391 | 2.0336 | 0.0055 | 0.0081 | 2.00 |
| 635 | 0.0000 | 0.0000 | 0.0000 | 0.0028 | 2.00 |
| | 0.5601 | 0.5585 | 0.0016 | 0.0031 | 2.00 |
| | 1.0512 | 1.0485 | 0.0027 | 0.0030 | 2.00 |
| | 1.9294 | 1.9317 | -0.0023 | 0.0083 | 2.00 |


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REPORT OF CALIBRATION

Certificate No. : SP23-021Page 4 of 5

Photometric Accuracy :

| Wavelength (nm.) | CRMs Values (Abs) | UUC Reading (Abs) | Correction (Abs) | Uncertainty (Abs) | Coverage factor k |
|------------------|-------------------|-------------------|------------------|-------------------|-------------------|
| 235 | 0.0000 | 0.0000 | 0.0000 | 0.0050 | 2.00 |
| | 0.7478 | 0.7436 | 0.0042 | 0.0058 | 2.00 |
| 257 | 0.0000 | 0.0000 | 0.0000 | 0.0050 | 2.00 |
| | 0.8686 | 0.8648 | 0.0038 | 0.0064 | 2.00 |
| 313 | 0.0000 | 0.0000 | 0.0000 | 0.0050 | 2.00 |
| | 0.2912 | 0.2908 | 0.0004 | 0.0052 | 2.00 |
| 350 | 0.0000 | 0.0000 | 0.0000 | 0.0050 | 2.00 |
| | 0.6448 | 0.6398 | 0.0050 | 0.0058 | 2.00 |


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REPORT OF CALIBRATION

Certificate No. : SP23-021Page 5 of 5

Wavelength Accuracy :

| CRMs Values (nm.) | UUC Reading (nm.) | Correction (nm.) | Uncertainty (nm.) | Coverage factor k |
|-------------------|-------------------|------------------|-------------------|-------------------|
| 241.72 | 242.0 | -0.28 | 0.18 | 2.00 |
| 279.45 | 279.5 | -0.05 | 0.18 | 2.00 |
| 287.81 | 287.5 | 0.31 | 0.18 | 2.00 |
| 334.06 | 333.5 | 0.56 | 0.18 | 2.00 |
| 360.93 | 360.3 | 0.63 | 0.18 | 2.00 |
| 418.59 | 418.0 | 0.59 | 0.18 | 2.00 |
| 445.94 | 445.3 | 0.64 | 0.18 | 2.00 |
| 453.66 | 453.0 | 0.66 | 0.18 | 2.00 |
| 460.02 | 459.6 | 0.42 | 0.18 | 2.00 |
| 536.59 | 536.4 | 0.19 | 0.18 | 2.00 |
| 637.98 | 638.3 | -0.32 | 0.18 | 2.00 |
| 431.38 | 431.0 | 0.38 | 0.18 | 2.00 |
| 472.50 | 472.5 | 0.00 | 0.18 | 2.00 |
| 513.47 | 513.5 | -0.03 | 0.18 | 2.00 |
| 528.88 | 529.0 | -0.12 | 0.18 | 2.00 |
| 573.17 | 573.0 | 0.17 | 0.18 | 2.00 |
| 585.35 | 585.0 | 0.35 | 0.20 | 2.00 |
| 684.40 | 684.5 | -0.10 | 0.18 | 2.00 |
| 740.72 | 741.0 | -0.28 | 0.20 | 2.00 |
| 748.55 | 748.5 | 0.05 | 0.18 | 2.00 |
| 807.03 | 807.0 | 0.03 | 0.18 | 2.00 |
| 879.28 | 879.5 | -0.22 | 0.18 | 2.00 |

Remark : - UUC = Unit Under Calibration

- N/A = Not Available

- The result expanded uncertainty of measurement U is stated as the standard uncertainty of measurement multiplied by the coverage factor k, which for a normal distribution corresponds to a coverage probability of approximately 95%

- * Indicates non TISI accredited


- End of Certificate -

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ISO 17025
CALIBRATION 0404

CERTIFICATE OF CALIBRATION

Certificate No. : SP24-018Page 1 of 5

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

Address : 3 Soi Udomsuk 41, Sukhumvit Road, Bangchak, Phrakhanong, Bangkok 10260

Location of calibration : Laboratory 315

Equipment : UV-Vis Spectrophotometer

Manufacturer : Agilent Technologies

Model : Cary 60

Serial No. : MY15410009

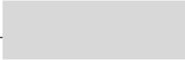

ID No. : UAE.WAT.020/2558

Received Date : 7 May 2024

Calibration Date : 7 May 2024

Issue Date : 9 May 2024

Condition Instrument : Good

Calibrated by : Approved by : 

Technical ManagerQuality Manager


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

The measurement capability of the laboratory and its traceability to recognized national standards and to the unit of measurement realized at the corresponding national standards laboratory. This certificate may not be reproduced other than in full except with the prior written approval of the DQE Services Co., Ltd.

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ISO 17025
CALIBRATION 0404

REPORT OF CALIBRATION

Certificate No. : SP24-018Page 2 of 5

Environment Condition : Ambient Temperature 25 ± 5 °C

Relative humidity 55 ± 20 %RH

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

Certified Reference Materials :

| Material | Serial No. | Certificate No. | Due date |
|-------------------------|------------|-----------------|-----------------|
| Absorbance Standard set | 25760 | 115663 | 25 October 2025 |
| Absorbance Standard set | 25757 | 115638 | 25 October 2025 |
| Wavelength Standard set | 25806 | 115657 | 25 October 2025 |
| Wavelength Standard set | 25758 | 115665 | 25 October 2025 |

Traceability : This certification is traceable to the International System of Unit maintained at National -
Institute of Standards and Technology (NIST) through Starna Scientific Limited

Spectral Band Width of UUC : 1.5 nm.

Scan Speed of UUC : 60 nm/min

Scan Interval of UUC : 0.15 nm.


Resolution of UUC : Photometric 0.0001 Abs.

Wavelength 0.1 nm.

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CALIBRATION 0404

REPORT OF CALIBRATION

Certificate No. : SP24-018Page 3 of 5

Calibration Results : Without adjustment


Photometric Accuracy :

| Wavelength (nm.) | CRMs Values (Abs) | UUC Reading (Abs) | Correction (Abs) | Uncertainty (Abs) | Coverage factor k |
|------------------|-------------------|-------------------|------------------|-------------------|-------------------|
| 420 | 0.0000 | 0.0000 | 0.0000 | 0.0028 | 2.00 |
| | 0.5780 | 0.5747 | 0.0033 | 0.0031 | 2.00 |
| | 1.0484 | 1.0438 | 0.0046 | 0.0029 | 2.00 |
| | 2.1876 | 2.1832 | 0.0044 | 0.0080 | 2.00 |
| 440 | 0.0000 | 0.0000 | 0.0000 | 0.0028 | 2.00 |
| | 0.5595 | 0.5581 | 0.0014 | 0.0034 | 2.00 |
| | 1.0239 | 1.0231 | 0.0008 | 0.0035 | 2.00 |
| | 2.1230 | 2.1219 | 0.0011 | 0.0080 | 2.00 |
| 465 | 0.0000 | 0.0000 | 0.0000 | 0.0028 | 2.00 |
| | 0.5230 | 0.5184 | 0.0046 | 0.0030 | 2.00 |
| | 0.9633 | 0.9614 | 0.0019 | 0.0029 | 2.00 |
| | 1.9753 | 1.9731 | 0.0022 | 0.0070 | 2.00 |
| 546.1 | 0.0000 | 0.0000 | 0.0000 | 0.0028 | 2.00 |
| | 0.5181 | 0.5150 | 0.0031 | 0.0031 | 2.00 |
| | 1.0002 | 0.9964 | 0.0038 | 0.0033 | 2.00 |
| | 1.9973 | 1.9914 | 0.0059 | 0.0088 | 2.00 |
| 590 | 0.0000 | 0.0000 | 0.0000 | 0.0028 | 2.00 |
| | 0.5517 | 0.5485 | 0.0032 | 0.0030 | 2.00 |
| | 1.0803 | 1.0772 | 0.0031 | 0.0030 | 2.00 |
| | 2.0373 | 2.0293 | 0.0080 | 0.0080 | 2.00 |
| 635 | 0.0000 | 0.0000 | 0.0000 | 0.0028 | 2.00 |
| | 0.5591 | 0.5565 | 0.0026 | 0.0031 | 2.00 |
| | 1.0518 | 1.0482 | 0.0036 | 0.0030 | 2.00 |
| | 1.9274 | 1.9202 | 0.0072 | 0.0079 | 2.00 |

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ISO 17025
CALIBRATION 0404

REPORT OF CALIBRATION

Certificate No. : SP24-018Page 4 of 5

Photometric Accuracy :

| Wavelength (nm.) | CRMs Values (Abs) | UUC Reading (Abs) | Correction (Abs) | Uncertainty (Abs) | Coverage factor k |
|------------------|-------------------|-------------------|------------------|-------------------|-------------------|
| 235 | 0.0000 | 0.0000 | 0.0000 | 0.0050 | 2.00 |
| | 0.7469 | 0.7435 | 0.0034 | 0.0057 | 2.00 |
| 257 | 0.0000 | 0.0000 | 0.0000 | 0.0050 | 2.00 |
| | 0.8674 | 0.8639 | 0.0035 | 0.0060 | 2.00 |
| 313 | 0.0000 | 0.0000 | 0.0000 | 0.0050 | 2.00 |
| | 0.2919 | 0.2907 | 0.0012 | 0.0051 | 2.00 |
| 350 | 0.0000 | 0.0000 | 0.0000 | 0.0050 | 2.00 |
| | 0.6430 | 0.6402 | 0.0028 | 0.0055 | 2.00 |

เอกสารไม่ควบคุม

REPORT OF CALIBRATION

Certificate No. : SP24-018

Page 5 of 5

Wavelength Accuracy :

| CRMs Values (nm.) | UUC Reading (nm.) | Correction (nm.) | Uncertainty (nm.) | Coverage factor k |
|----------------------|----------------------|---------------------|----------------------|----------------------|
| 241.72 | 242.0 | -0.28 | 0.18 | 2.00 |
| 279.45 | 279.5 | -0.05 | 0.18 | 2.00 |
| 287.81 | 287.9 | -0.09 | 0.18 | 2.00 |
| 334.06 | 333.9 | 0.16 | 0.18 | 2.00 |
| 360.93 | 360.5 | 0.43 | 0.18 | 2.00 |
| 418.59 | 418.1 | 0.49 | 0.18 | 2.00 |
| 445.94 | 445.6 | 0.34 | 0.18 | 2.00 |
| 453.66 | 453.3 | 0.36 | 0.18 | 2.00 |
| 460.02 | 459.8 | 0.22 | 0.18 | 2.00 |
| 536.59 | 536.0 | 0.59 | 0.18 | 2.00 |
| 637.98 | 638.7 | -0.72 | 0.18 | 2.00 |
| 431.38 | 430.8 | 0.58 | 0.18 | 2.00 |
| 472.50 | 472.4 | 0.10 | 0.18 | 2.00 |
| 513.47 | 513.7 | -0.23 | 0.18 | 2.00 |
| 528.88 | 529.1 | -0.22 | 0.18 | 2.00 |
| 573.17 | 573.5 | -0.33 | 0.18 | 2.00 |
| 585.35 | 585.2 | 0.15 | 0.20 | 2.00 |
| 684.40 | 685.1 | -0.70 | 0.18 | 2.00 |
| 740.72 | 741.4 | -0.68 | 0.20 | 2.00 |
| 748.55 | 749.1 | -0.55 | 0.18 | 2.00 |
| 807.03 | 807.3 | -0.27 | 0.18 | 2.00 |
| 879.28 | 879.3 | -0.02 | 0.18 | 2.00 |

Remark : - UUC = Unit Under Calibration

- N/A = Not Available

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

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

- * Indicates non TISI accredited

- End of Certificate -

เอกสารไม่ควบคุม



Cert. No.: 23TM378

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 : 11 April 2023

Calibration Date : 12 April 2023

Ambient Temperature : (26 ± 10) °C

Relative Humidity : (50 ± 30) %

Calibrated by : Preecha Hlahib

Approved by : 

Approved Signatory

Issue Date : 24 April 2023

The Uncertainties are for a confidence probability of approximately 95%

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Uncontrolled Document



Equipment : Incubator

Condition As-Received : Used Item

Reference : 2304-0155OC-1

Cert. No.: 23TM378

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 | MY49001451 | 23LM27 | 25 Feb 2024 |

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

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

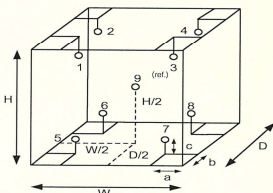
Result of Calibration :- (*) Without Adjustment

Function of UUC* : Temperature Source

Fresh air setting : Not Available

| Environment during calibration | | |
|--------------------------------|-----------|----------|
| | Beginning | Finished |
| Temp. (°C) | 25 | 26 |
| REL.Humid. (%) | 57 | 61 |
| AC Supply (Volt) | 220 | 220 |

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



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 m³

Uncontrolled Document



Equipment : Incubator

Condition As-Received : Used Item

Reference : 2304-0155OC-1

Result of Calibration :- (*) Without Adjustment

Function of UUC* : Temperature Source

Fresh air setting : Not Available

Cert. No.: 23TM378

Page : 3 of 3

| Calibration Point (°C) | UUC* Setting (°C) | UUC* Reading (°C) | Temperature stability (± °C) | Temperature uniformity (°C) | Overall Variation (°C) | Coverage Factor k |
|--------------------------|---------------------|---------------------|--------------------------------|-------------------------------|--------------------------|-------------------|
| 35.0 | 35.0 | 35.0 | 0.052 | 0.53 | 0.60 | 2 |

| Calibration Point (°C) | Measured Temperature (°C) | | | | | | | | | Uncertainty (± °C) |
|--------------------------|-----------------------------|--------|--------|--------|--------|--------|--------|--------|----------|----------------------|
| | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 (ref.) | |
| 35.0 | 35.092 | 35.148 | 34.817 | 35.149 | 34.894 | 35.323 | 34.773 | 35.058 | 34.802 | 0.30 |

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

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

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

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

UUC* : Unit Under Calibration

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

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

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Uncontrolled Document



Certificate of Calibration

Cert. No.: 24TM648
Page : 1 of 3

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 Udumuk 41, Sukhumvit Road,
Bangchak, Phrakhanong,
Bangkok 10260
Location : Microbiology Laboratory
Received Order : 01 April 2024
Calibration Date : 01 April 2024
Ambient Temperature : (26 ± 10) °C
Relative Humidity : (50 ± 30) %
Calibrated by : Man Pattanapongpaiboon
Approved by :
 ()
 (✓)
 ()
Issue Date : 7 April 2024

The Uncertainties are for a confidence probability of approximately 95%

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

เอกสารไม่ควบคุม



Equipment : Incubator
Condition As-Received : Used Item
Reference : 2404-0003OC-1
Procedure Used :-

Cert. No.: 24TM648
Page : 2 of 3

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

Condition of this result of calibration

1. Reference standard instrument:-

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

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

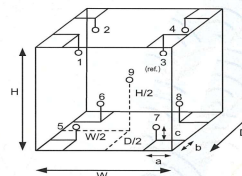
3. This certification is traceable to the International System of Unit.

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

Result of Calibration :- () Without Adjustment

Function of UUC* : Temperature Source
Fresh air setting : Close

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



Probe Installation Details :

a = 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 m³

| Position : | Ref. Std. ID No.: |
|------------|-------------------|
| 1 | 19-16RTD-01 |
| 2 | 19-16RTD-02 |
| 3 | 19-16RTD-03 |
| 4 | 19-16RTD-04 |
| 5 | 19-16RTD-05 |
| 6 | 19-16RTD-06 |
| 7 | 21-16RTD-07 |
| 8 | 19-16RTD-08 |
| 9 (ref.) | 19-16RTD-09 |

เอกสารไม่ควบคุม



Equipment : Incubator
Condition As-Received : Used Item
Reference : 2404-0003OC-1
Result of Calibration :- () Without Adjustment
Function of UUC* : Temperature Source
Fresh air setting : Close

Cert. No.: 24TM648
Page : 3 of 3

| Calibration Point (°C) | UUC* Setting (°C) | UUC* Reading (°C) | Temperature stability (± °C) | Temperature uniformity (°C) | Overall Variation (°C) | Coverage Factor k |
|--------------------------|---------------------|---------------------|--------------------------------|-------------------------------|--------------------------|-------------------|
| 35.0 | 35.0 | 35.0 | 0.028 | 0.13 | 0.24 | 2 |

| Calibration Point (°C) | Measured Temperature (°C) | | | | | | | | | Uncertainty (± °C) |
|--------------------------|-----------------------------|--------|--------|--------|--------|--------|--------|--------|----------|----------------------|
| | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 (ref.) | |
| 35.0 | 34.908 | 35.004 | 34.989 | 35.099 | 35.089 | 35.095 | 34.921 | 34.936 | 35.002 | 0.30 |

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

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

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

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

UUC* : Unit Under Calibration

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

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

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เอกสารไม่ควบคุม



Certificate of Calibration

Cert. No.: 24TM30
Page : 1 of 3

Equipment : Water Bath
Manufacturer : Memmert
Model : WNE 14
Serial No. : L416.0612
ID No. : UAE.MIC.003/2560
Submitted by : United Analyst and Engineering Consultant Co.,Ltd.
3 Soi Udumuk 41, Sukhumvit Road,
Bangchak, Phrakhanong,
Bangkok 10260
Location : Microbiology Laboratory
Received Order : 10 February 2024
Calibration Date : 10 February 2024
Ambient Temperature : (26 ± 10) °C
Relative Humidity : (50 ± 30) %
Calibrated by : Krisda Malee
Approved by :
 ()
 (✓)
 ()
Issue Date : 19 February 2024

The Uncertainties are for a confidence probability of approximately 95%

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

เอกสารไม่ควบคุม



Equipment : Water Bath
 Condition As-Received : Used Item
 Reference : 2402-0232OC-3
 Procedure Used :-

Cert. No.: 24TM30
 Page : 2 of 3

Calibration were conducted using in-house calibration procedure CP-OT04 Based on ASTM E715 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 **Serial No.** **Cert. No.** **Traceable** **Due Date**
 1) Data Acquisition MY49001451 23LM27 TPA 25 Feb 2024
 2. This certificate is valid only to the item calibrated on date and place of calibration.
 3. This certification is traceable to the International System of Unit.

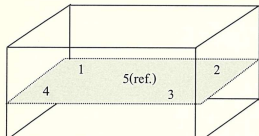
Remark : TPA : Technology Promotion Association (Thailand - Japan)

Result of Calibration :- (*) Without Adjustment

Function of UUC* : Temperature Source

Heat transfer medium used : Water

| | Environmental | | AC Voltage Supply |
|--------------------------|---------------|-----------|-------------------|
| | (°C) | (%R.H.) | (Volt) |
| Beginning of Calibration | 24 | 54 | 221 |
| Finished of Calibration | 26 | 55 | 220 |



Front

| Position : | Ref. Std. ID No.: |
|------------|-------------------|
| 1 | N37P301419 |
| 2 | N37P300732 |
| 3 | N37P301420 |
| 4 | N37P301421 |
| 5(ref.) | N37P301425 |

เอกสาร



Equipment : Water Bath
 Condition As-Received : Used Item
 Reference : 2402-0232OC-3
 Result of Calibration :- (*) Without Adjustment
 Function of UUC* : Temperature Source

Cert. No.: 24TM30
 Page : 3 of 3

| Calibration point (°C) | UUC* Setting (°C) | UUC* Reading (°C) | Average* Standard Reading (°C) | | | | | Uncertainty (± °C) |
|--------------------------|---------------------|---------------------|----------------------------------|--------|--------|--------|----------|----------------------|
| | | | 1 | 2 | 3 | 4 | 5 (ref.) | |
| 44.5 | 44.6 | 44.6 | 44.491 | 44.463 | 44.496 | 44.518 | 44.528 | 0.15 |

| Calibration point (°C) | Uniformity (°C) | Stability (± °C) | Coverage Factor k |
|--------------------------|-------------------|--------------------|-------------------|
| 44.5 | 0.12 | 0.059 | 2 |

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

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

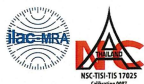
Stability : One-half of the greatest maximum difference of measured temperature at any one probe.
UUC* : Unit Under Calibration

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

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

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เอกสาร



Certificate of Calibration

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

Certificate No.: C11230106
Issued Date: 11 June 2023
Job No.: KSPR2308770
Page: 1 of 4

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

Environment Condition: Temperature: 22 °C ± 0.8 °C
 Humidity: 58 %RH ± 4.0 %RH
 Voltage: 229 VAC ± 1.3 VAC

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

Calibration By: [Signature]
Calibration Date: 09 June 2023

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

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

Person in charge

Authorized signatory

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

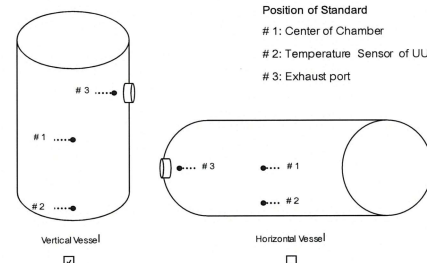
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 DKSH Technology Limited
 2533 สุขุมวิท ถนน, กรุงเทพฯ, ประเทศไทย 10260
 Phone: +66 2638 7100 Email: info.calibration@dksh.com Website: www.dksh.com/scientific-thailand

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 CAL-FM-C11-15: 12 Sep 2022

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Certificate No.: C11230106 Page: 2 of 4



Standard Installation Locations

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

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

Definitions

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

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

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

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 Phone: +66 2638 7100 Email: info.calibration@dksh.com Website: www.dksh.com/scientific-thailand

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 CAL-FM-C11-15: 12 Sep 2022

Calibration Results:

Without adjustment

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

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

Temperature Distribution

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

Chamber Characterization

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

Note: * Maximum uncertainty of the each position

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

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CAL-FM-C11-15: 12 Sep 2022

Without adjustment

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

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

Temperature Distribution

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

Chamber Characterization

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

Note: * Maximum uncertainty of the each position

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

The End of Certificate

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CAL-FM-C11-15: 12 Sep 2022



Certificate of Calibration

Equipment: Balance
Model: PX623
Serial No. (or ID.): C236754745 (UAE.MIC.055/2565)
Manufacturer: Ohaus
Condition: In condition

Certificate No.: C01234158
Issued Date: 08 December 2023
Job No.: WO-00011251
Page: 1 of 3

Customer: United Analyst and Engineering Consultant Co., Ltd.
3 Soi Udomsuk 41, Sukhumvit Road, Bangchak Sub-District,
Phrakhanong District, Bangkok, THAILAND 10260

Environment Condition: Temperature 25 °C ± 0.5 °C
Humidity 54 %RH ± 1.7 %RH

Calibration Place: United Analyst and Engineering Consultant Co., Ltd. (301 Microbiology Room)
3 Soi Udomsuk 41, Sukhumvit Road, Bangchak Sub-District,
Phrakhanong District, Bangkok, THAILAND 10260

Calibration By:
Calibration Date: 07 December 2023

The Method used: In-house method, CAL-WI-47, based on UKAS Lab 14

Traceability: This certificate is traceable to the SI Units maintained by National Institute of Metrology (NIMT), Thailand through DKSH Technology Co., Ltd. Certificate No. C02222534

Person in charge

Authorized signatory

This certificate is issued the units of measurement according to the International System of Units (SI). It provides traceability of measurement to international or national standard or other recognized national standard laboratories.
The measurement uncertainty stated is the expanded uncertainty which is obtained from the standard uncertainty multiplied by the coverage factor (k=2) to provide a level of confidence of approximately 95%. It is determined in accordance with the Guide to Expression of Uncertainty in Measurement (GUM).
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CAL-FM-C01-14: 12 Sep 2022

Calibration Results:

Before Adjustment

Eccentric Error: Weight to be 1/3 or 1/2 of Maximum capacity, taken from the center of the pan as a zero reference.

| | | | | | | | | | | | | | | |
|---|--|-------|---|--------|--|---|--|-------|--------------------|--|-----|--|-----|--|
|  | | |  | | |  | | | Nominal Test Value | | 200 | | (g) | |
| Reference Points (g) | | | | | | | | | | | | | | |
| A | | B | | C | | D | | E | | | | | | |
| - | | 0.000 | | -0.003 | | 0.000 | | 0.001 | | | | | | |

Repeatability: Determination of the standard deviation of weighing balance., Readability 0.001 (g)

| Nominal test value (g) | Standard Deviation |
|------------------------|--------------------|
| 50 | 0.0006 |
| 500 | 0.0008 |

Error of Indication from nominal or conventional mass value., Readability 0.001 (g)

| Nominal Value (g) | Conventional Mass (g) | Displayed Value (g) | Error of indication (g) | Uncertainty (g) | k |
|-------------------|-----------------------|---------------------|-------------------------|-----------------|------|
| 1 | 1.0000 | 1.000 | 0.000 | 0.0013 | 2.10 |
| 5 | 5.0001 | 5.000 | 0.000 | 0.0013 | 2.10 |
| 10 | 10.0001 | 10.001 | 0.001 | 0.0013 | 2.10 |
| 20 | 20.0000 | 20.000 | 0.000 | 0.0013 | 2.09 |
| 50 | 50.0001 | 50.000 | 0.000 | 0.0013 | 2.09 |
| 100 | 100.0001 | 100.001 | 0.001 | 0.0013 | 2.09 |
| 200 | 200.0004 | 200.002 | 0.002 | 0.0014 | 2.07 |
| 300 | 300.0005 | 300.002 | 0.002 | 0.0015 | 2.05 |
| 400 | 400.0006 | 400.004 | 0.003 | 0.0016 | 2.03 |
| 500 | 500.0006 | 500.008 | 0.007 | 0.0019 | 2.02 |
| 600 | 600.0007 | 600.009 | 0.008 | 0.0021 | 2.01 |

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CAL-FM-C01-14: 12 Sep 2022

After Adjustment

Eccentric Error: Weight to be 1/3 or 1/2 of Maximum capacity, taken from the center of the pan as a zero reference.

| Nominal Test Value | | 200 (g) | |
|--------------------|-------|----------------------|--------|
| | | Reference Points (g) | |
| A | B | C | D |
| - | 0.001 | -0.002 | -0.002 |
| | | | 0.001 |

Repeatability: Determination of the standard deviation of weighing balance., Readability 0.001 (g)

| Nominal test value (g) | Standard Deviation |
|------------------------|--------------------|
| 50 | 0.0006 |
| 500 | 0.0008 |

Error of Indication from nominal or conventional mass value., Readability 0.001 (g)

| Nominal Value (g) | Conventional Mass (g) | Displayed Value (g) | Error of Indication (g) | Uncertainty (g) | k |
|-------------------|-----------------------|---------------------|-------------------------|-----------------|------|
| 1 | 1.0000 | 1.000 | 0.000 | 0.0013 | 2.10 |
| 5 | 5.0001 | 5.000 | 0.000 | 0.0013 | 2.10 |
| 10 | 10.0001 | 10.000 | 0.000 | 0.0013 | 2.10 |
| 20 | 20.0000 | 20.000 | 0.000 | 0.0013 | 2.10 |
| 50 | 50.0001 | 50.000 | 0.000 | 0.0013 | 2.10 |
| 100 | 100.0001 | 100.000 | 0.000 | 0.0014 | 2.09 |
| 200 | 200.0004 | 200.000 | 0.000 | 0.0014 | 2.07 |
| 300 | 300.0005 | 300.001 | 0.001 | 0.0015 | 2.05 |
| 400 | 400.0006 | 400.002 | 0.001 | 0.0017 | 2.04 |
| 500 | 500.0006 | 500.001 | 0.000 | 0.0019 | 2.02 |
| 600 | 600.0007 | 600.002 | 0.001 | 0.0021 | 2.01 |

The End of Certificate

Statements of conformity:

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

The error of indication determined during calibration are under given measurement and environmental conditions and considering the expanded measurement uncertainty (coverage probability 95%) within the specification. The given measurement uncertainty already includes other all effects by according to the standard method, UKAS Lab14. Therefore, those parameters have not been assessed separately.

Tolerance and Decision rules:

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

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

Authorized signatory

Statements of conformity:

Before Adjustment

Readability: 0.001 g

| Nominal Value g | Error of indication g | Guard band (w) g | Tolerance (±) g | Conformity |
|-----------------|-----------------------|------------------|-----------------|------------|
| 1 | 0.000 | 0.0013 | 0.002 | Pass |
| 5 | 0.000 | 0.0013 | 0.010 | Pass |
| 10 | 0.001 | 0.0013 | 0.020 | Pass |
| 20 | 0.000 | 0.0013 | 0.040 | Pass |
| 50 | 0.000 | 0.0013 | 0.100 | Pass |
| 100 | 0.001 | 0.0013 | 0.200 | Pass |
| 200 | 0.002 | 0.0014 | 0.400 | Pass |
| 300 | 0.002 | 0.0015 | 0.600 | Pass |
| 400 | 0.003 | 0.0016 | 0.800 | Pass |
| 500 | 0.007 | 0.0019 | 1.000 | Pass |
| 600 | 0.008 | 0.0021 | 1.200 | Pass |

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

Statements of conformity:

After Adjustment

Readability: 0.001 g

| Nominal Value g | Error of indication g | Guard band (w) g | Tolerance (±) g | Conformity |
|-----------------|-----------------------|------------------|-----------------|------------|
| 1 | 0.000 | 0.0013 | 0.002 | Pass |
| 5 | 0.000 | 0.0013 | 0.010 | Pass |
| 10 | 0.000 | 0.0013 | 0.020 | Pass |
| 20 | 0.000 | 0.0013 | 0.040 | Pass |
| 50 | 0.000 | 0.0013 | 0.100 | Pass |
| 100 | 0.000 | 0.0014 | 0.200 | Pass |
| 200 | 0.000 | 0.0014 | 0.400 | Pass |
| 300 | 0.001 | 0.0015 | 0.600 | Pass |
| 400 | 0.001 | 0.0017 | 0.800 | Pass |
| 500 | 0.000 | 0.0019 | 1.000 | Pass |
| 600 | 0.001 | 0.0021 | 1.200 | Pass |

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

The End of Statements of conformity

ใบตรวจสอบสภาพเครื่องชั่ง

ชนิดเครื่องมือ: Balance

รุ่น: PX623

เลขที่ใบงาน: WO-00011251

หมายเลขเครื่อง: C236754745

| ตรวจสอบ (รับ) | | รายการตรวจเช็ค | ตรวจสอบ (ส่ง) | | หมายเหตุ |
|-------------------------------------|--------------------------|---|-------------------------------------|--------------------------|----------|
| 07 Dec 2023 | | | 07 Dec 2023 | | |
| ปกติ | ไม่ปกติ | | ปกติ | ไม่ปกติ | |
| | | General | | | |
| <input checked="" type="checkbox"/> | <input type="checkbox"/> | 1. สายไฟ/Adapter, power supply 220/110V | <input checked="" type="checkbox"/> | <input type="checkbox"/> | |
| <input checked="" type="checkbox"/> | <input type="checkbox"/> | 2. ความสมบูรณ์ชุดกระจกกันลม (Cover) | <input checked="" type="checkbox"/> | <input type="checkbox"/> | |
| <input checked="" type="checkbox"/> | <input type="checkbox"/> | 3. ความสมบูรณ์ชุดชั่งระดับน้ำ | <input checked="" type="checkbox"/> | <input type="checkbox"/> | |
| <input checked="" type="checkbox"/> | <input type="checkbox"/> | 4. การปรับระดับของขาตั้งเครื่อง | <input checked="" type="checkbox"/> | <input type="checkbox"/> | |
| <input checked="" type="checkbox"/> | <input type="checkbox"/> | 5. การตรวจสอบเสียงของไม่กด | <input checked="" type="checkbox"/> | <input type="checkbox"/> | |
| <input checked="" type="checkbox"/> | <input type="checkbox"/> | 6. ความสมบูรณ์ของ Display | <input checked="" type="checkbox"/> | <input type="checkbox"/> | |
| <input checked="" type="checkbox"/> | <input type="checkbox"/> | 7. การแสดงผลของ Display หลังวางน้ำหนัก | <input checked="" type="checkbox"/> | <input type="checkbox"/> | |
| <input checked="" type="checkbox"/> | <input type="checkbox"/> | 8. ชุดรองจานชั่ง (Stopper) / pan support | <input checked="" type="checkbox"/> | <input type="checkbox"/> | |
| <input checked="" type="checkbox"/> | <input type="checkbox"/> | 9. การทำงานของ Function Internal / External | <input checked="" type="checkbox"/> | <input type="checkbox"/> | |
| <input checked="" type="checkbox"/> | <input type="checkbox"/> | 10. ความสะอาดในตัวเครื่องภายนอกและแกน load cell | <input checked="" type="checkbox"/> | <input type="checkbox"/> | |
| <input checked="" type="checkbox"/> | <input type="checkbox"/> | 11. สภาวะแวดล้อม ณ สถานที่ตั้งเครื่อง | <input checked="" type="checkbox"/> | <input type="checkbox"/> | |

หมายเหตุเพิ่มเติมข้อแนบไป :

Service Engineer

บริษัท ดีเคเอสเอช (ประเทศไทย) จำกัด
 DKSH Technology Limited
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 Delivering Growth - In Asia and Beyond.

เอกสารไม่ควบคุม

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