

## ภาคผนวกที่ 4

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ใบรับรองการสอบเทียบเครื่องมือ

## Certificate of Calibration

**Certificate No. :** 66-200067-1

**Page : 1 of 2**

**Submitted by :** M E T Company Limited  
36/659 Moo 6, T. Bangrakpattana, A. Bangbuatong, Nonthaburi 11110

**Equipment :** Electronic Balance  
Manufacturer : METTLER TOLEDO Model : AG285  
Serial No. : 1122140126 ID No. : MET-EB01/46  
Capacity : 210 g Resolution : 0.00001g/81g, 0.0001g/210g

**Environment :** On site calibration was carried out at the Laboratory, M E T Company Limited  
Ambient Temperature : (26.4 to 26.8) °C  
Relative Humidity : (54.9 to 58.8) %  
Air Pressure : 1013.0 mbar

**Date of Received :** 02 March 2023

**Date of Calibration :** 02 March 2023

**Date of Issue :** 13 March 2023

**Calibrated by :** Akaradath Thippichai

**Calibration Method :** In-house method CAL-M2001 based on UKAS Publication ref : LAB 14  
Edition 7 - November 2022

**Reference Standard Instruments :** This certification is traceable to the International System of Units

Standard Weights

| ID No.     | Cert. No. | Due Date    | Traceability                                       |
|------------|-----------|-------------|----------------------------------------------------|
| E261-E2624 | C02222345 | 10 Nov 2023 | National Institute of Metrology (Thailand), (NIMT) |

Approved by :

Laboratory Manager

The Uncertainties are for a confidence probability of approximately 95%

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## Certificate of Calibration

**Certificate No. : 66-200067-1**

**Page : 2 of 2**

**Result of Calibration :** Without Adjustment

**UUC Condition As-Received :** Good

Departure of indication from nominal value

| Nominal Value<br>(g) | Correction<br>(g) | Uncertainty<br>$\pm$ (g) |
|----------------------|-------------------|--------------------------|
| 0.01                 | 0.00001           | 0.000020                 |
| 0.1                  | 0.00000           | 0.000019                 |
| 1                    | -0.00002          | 0.000031                 |
| 5                    | -0.00004          | 0.000043                 |
| 10                   | -0.00008          | 0.000054                 |
| 20                   | -0.00027          | 0.000071                 |
| 50                   | -0.00059          | 0.00011                  |
| 100                  | -0.0009           | 0.00023                  |
| 150                  | -0.0012           | 0.00038                  |
| 200                  | -0.0019           | 0.00040                  |

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

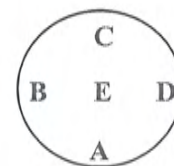
This reported uncertainty of measurement was based on a standard uncertainty multiplied by a coverage factor  $k = 2.43$ , providing a level of confidence of approximately 95%

Eccentric error

Load test : 50 g

A B C D E

0.00055 0.00027 -0.00015 -0.00018 0.00000 g



Repeatability

Load test : 200 g

Stdev. : 0.000053 g

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## Certificate of Calibration

**Certificate No. :** 66-420002-1

**Page : 1 of 2**

**Submitted by :** M E T Company Limited

36/659 Moo 6, T.Bangrakpattana, A.Bangbuatong, Nonthaburi 11110

**Equipment :** pH Meter with electrode

pH meter

Manufacturer : Eutech

Model : pH 150

Range : -2.00 to 16.00 pH

Resolution : 0.01 pH

Serial No. : 2657036

ID No. : MET-PH04/60

Electrode

Model : N/A

Serial No. : 66365

**Environment :** Ambient Temperature :  $(25 \pm 2) ^\circ \text{C}$

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

**Date of Received :** 05 January 2023

**Date of Calibration :** 11 January 2023

**Date of Issue :** 11 January 2023

**Calibrated by :** Bunjerd Masri

**Calibration Method :** In-house method CAL-M4201 direct measurement by using standard voltage calibrator and using certified reference material (CRM)

**Reference Standard Instruments :** This certification is traceable to the International System of Units

### 1. Multiproduct Calibrator

| <u>ID No.</u> | <u>Cert. No.</u> | <u>Due Date</u> | <u>Traceability</u>                             |
|---------------|------------------|-----------------|-------------------------------------------------|
| 440001        | 21E997           | 17 Mar 2023     | National Institute of Metrology Thailand (NIMT) |

### 2. Standard Buffer Solution

| <u>pH</u> | <u>Cert. No.</u> | <u>Lot No.</u> | <u>Exp. Date</u> | <u>Traceability</u>                                     |
|-----------|------------------|----------------|------------------|---------------------------------------------------------|
| 4.008     | 61235182         | 857394         | 11 Dec 2024      | CPA Chem Ltd. Accredited to ISO 17034 and ISO/IEC 17025 |
| 6.986     | 61267169         | 857395         | 11 Dec 2023      | CPA Chem Ltd. Accredited to ISO 17034 and ISO/IEC 17025 |
| 10.010    | 61260481         | 857396         | 11 Dec 2023      | CPA Chem Ltd. Accredited to ISO 17034 and ISO/IEC 17025 |

Approved by

Supervisor

The Uncertainties are for a confidence probability of approximately 95%

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## Certificate of Calibration

**Certificate No. : 66-420002-1**

**Page : 2 of 2**

**Result of Calibration :**

**UUC Condition As-Received :** Good

**Function :** Electrical measurement

pH meter

Performing standard curve by Multiproduct Calibrator at pH (4,7,10)

| Adjustment Curve<br>at nominal pH | Applied Voltage<br>( mV ) | Nominal Value<br>( pH ) | UUC Reading |        | Correction<br>( mV ) | Uncertainty<br>( ± mV ) |
|-----------------------------------|---------------------------|-------------------------|-------------|--------|----------------------|-------------------------|
|                                   |                           |                         | ( pH )      | ( mV ) |                      |                         |
| 4, 7, 10                          | 177.4800                  | 4                       | 4.00        | 177.1  | 0.4                  | 0.060                   |
|                                   | 0.0000                    | 7                       | 6.99        | -0.1   | 0.1                  | 0.060                   |
|                                   | -177.4800                 | 10                      | 10.00       | -177.3 | -0.2                 | 0.060                   |

**Function :** pH meter with electrode

Performing a three - buffer standard curve using buffer nominal pH (4,7,10)

| Adjustment Curve<br>at nominal pH | Standard Buffer<br>( pH ) | UUC Reading<br>( pH ) | Correction<br>( pH ) | Uncertainty<br>( ± pH ) |
|-----------------------------------|---------------------------|-----------------------|----------------------|-------------------------|
| 4, 7, 10                          | 4.008                     | 4.01                  | 0.00                 | 0.0097                  |
|                                   | 6.986                     | 7.00                  | -0.01                | 0.011                   |
|                                   | 10.010                    | 10.01                 | 0.00                 | 0.014                   |

Remark

UUC : Unit Under Calibration

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

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

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## Certificate of Calibration

**Certificate No. :** 64-400425-5

**Page : 1 of 2**

**Submitted by :** M E T Company Limited

36/659 Moo 6, T.Bangrakpattana, A.Bangbuatong, Nonthaburi 11110

**Equipment :** Air Chamber (Incubator)

Manufacturer : M-LAB

Model : BIC-140

Range : N/A °C

Resolution : 0.1 °C

Serial No. : 240412

ID No. : MET-BI01/55

**Environment :** On site calibration was carried out at the Laboratory, M E T Company Limited

Ambient Temperature : (27.0 to 28.0) °C

Relative Humidity : (50 to 55) %

Line Voltage : (210.0 to 210.8) V

**Date of Received :** 10 August 2022

**Date of Calibration :** 10 August 2022

**Date of Issue :** 13 August 2022

**Calibrated by :** Permpoon Chanpu

**Calibration Method :** CAL-M4004, TLAS G-20

The temperature scale used was based on ITS-90

**Reference Standard Instruments :** This certification is traceable to the International System of Units

Standard Digital Thermometer with Thermocouple probe

| <u>ID No.</u>   | <u>Cert. No.</u> | <u>Due Date</u> | <u>Traceability</u>                             |
|-----------------|------------------|-----------------|-------------------------------------------------|
| 400029 & 400032 | 65-400274-1      | 25 Nov 2022     | National Institute of Metrology Thailand (NIMT) |

Approved by : \_\_\_\_\_

Supervisor

The Uncertainties are for a confidence probability of approximately 95%

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## Certificate of Calibration

Certificate No. :64-400425-5

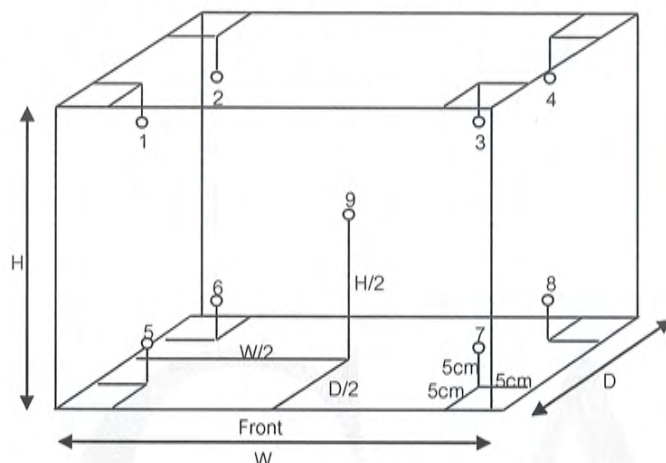
Page : 2 of 2

Result of Calibration : Without Adjustment

UUC Condition As-Received : Good

Function : Temperature measurement

This instrument was setting air ventilation at position 0 (close)



Inside of Chamber

W = 0.37 m

D = 0.33 m

H = 1.14 m

Capacity = 0.14 m<sup>3</sup>

| Test Point<br>(°C) | Setting Temperature<br>(°C) | Indicating Temperature<br>(°C) | Measured Temperature (°C) @ Sensor No. |      |      |      |      |      |      |      |      | Uncertainty<br>(± °C) |
|--------------------|-----------------------------|--------------------------------|----------------------------------------|------|------|------|------|------|------|------|------|-----------------------|
|                    |                             |                                | 1                                      | 2    | 3    | 4    | 5    | 6    | 7    | 8    | 9    |                       |
| 20.0               | 20.0                        | 20.0                           | 19.8                                   | 19.7 | 19.6 | 19.6 | 20.4 | 20.2 | 20.3 | 19.8 | 19.9 | 0.54                  |

| Test Point<br>(°C) | Setting Temperature<br>(°C) | Indicating Temperature<br>(°C) | Measured Uniformity<br>(°C) | Measured Stability<br>(°C) | Overall Variation<br>(°C) |
|--------------------|-----------------------------|--------------------------------|-----------------------------|----------------------------|---------------------------|
| 20.0               | 20.0                        | 20.0                           | 0.6                         | 0.1                        | 1.0                       |

**Remark** The uncertainty is not combine uniformity of the air chamber

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

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

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## Certificate of Calibration

**Certificate No. :** 66-400476-2

**Page : 1 of 2**

**Submitted by :** M E T Company Limited  
36/659 Moo 6, T.Bangrakpattana, A.Bangbuatong, Nonthaburi 11110

**Equipment :** Air Chamber (Oven)  
Manufacturer : Binder Model : ED53  
Range : N/A °C Resolution : 1 °C  
Serial No. : 13-07419 ID No. : MET-OV02/57

**Environment :** On site calibration was carried out at the Laboratory, M E T Company Limited  
Ambient Temperature : (31.0 to 32.0) °C  
Relative Humidity : (55 to 60) %  
Line Voltage : (210.0 to 210.8) V

**Date of Received :** 23 August 2023

**Date of Calibration :** 23 August 2023

**Date of Issue :** 23 August 2023

**Calibrated by :** Permpon Chanpu

**Calibration Method :** CAL-M4004, TLAS G-20

The temperature scale used was based on ITS-90

**Reference Standard Instruments :** This certification is traceable to the International System of Units  
Standard Digital Thermometer with Thermocouple probe

| ID No.          | Cert. No.   | Due Date    | Traceability                                    |
|-----------------|-------------|-------------|-------------------------------------------------|
| 400029 & 400030 | 66-400227-1 | 24 Oct 2023 | National Institute of Metrology Thailand (NIMT) |

Approved by :

Supervisor

The Uncertainties are for a confidence probability of approximately 95%

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## Certificate of Calibration

**Certificate No. : 66-400476-2**

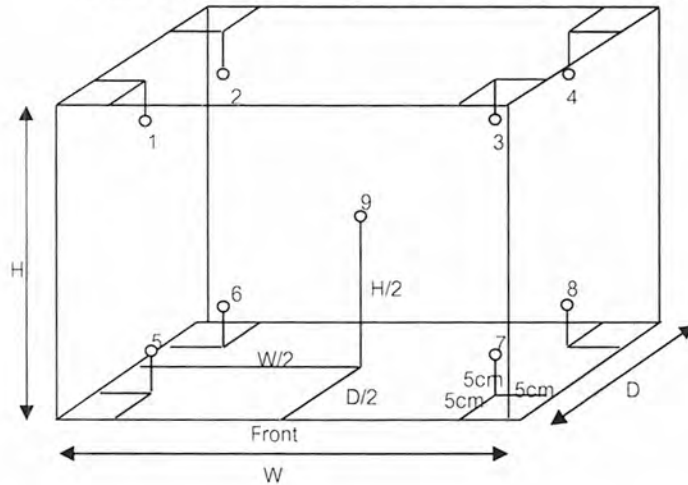
**Page : 2 of 2**

**Result of Calibration :** Without Adjustment

**UUC Condition As-Received :** Good

**Function :** Temperature measurement

This instrument was setting air ventilation at position 0 (close)



Inside of Chamber

W = 0.40 m

D = 0.33 m

H = 0.40 m

Capacity = 0.05 m<sup>3</sup>

| Test Point<br>( ° C ) | Setting Temperature<br>( ° C ) | Indicating Temperature<br>( ° C ) | Measured Temperature ( ° C ) @ Sensor No. |       |       |       |       |       |       |       |       | Uncertainty<br>( ± ° C ) |
|-----------------------|--------------------------------|-----------------------------------|-------------------------------------------|-------|-------|-------|-------|-------|-------|-------|-------|--------------------------|
|                       |                                |                                   | 1                                         | 2     | 3     | 4     | 5     | 6     | 7     | 8     | 9     |                          |
| 104                   | 110                            | 110                               | 105.0                                     | 105.0 | 105.0 | 104.9 | 103.9 | 103.9 | 104.2 | 104.2 | 104.2 | 0.94                     |
| 180                   | 184                            | 184                               | 180.1                                     | 181.9 | 180.8 | 179.7 | 180.2 | 180.8 | 180.7 | 180.8 | 180.2 | 1.2                      |

| Test Point<br>( ° C ) | Setting Temperature<br>( ° C ) | Indicating Temperature<br>( ° C ) | Measured Uniformity<br>( ° C ) | Measured Stability<br>( ° C ) | Overall Variation<br>( ° C ) |
|-----------------------|--------------------------------|-----------------------------------|--------------------------------|-------------------------------|------------------------------|
| 104                   | 110                            | 110                               | 1.0                            | 0.2                           | 1.3                          |
| 180                   | 184                            | 184                               | 1.9                            | 0.3                           | 2.7                          |

**Remark** The uncertainty is not combine uniformity of the air chamber

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

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

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## Certificate of Calibration

**Certificate No. :** 66-400476-1

**Page : 1 of 2**

**Submitted by :** M E T Company Limited

36/659 Moo 6, T.Bangrakpattana, A.Bangbuatong, Nonthaburi 11110

**Equipment :** Air Chamber (Oven)

Manufacturer : Memmert

Model : UM 100

Range : N/A °C

Resolution : 0.1 °C

Serial No. : b197.0985

ID No. : MET-OV01/46

**Environment :** On site calibration was carried out at the Laboratory, M E T Company Limited

Ambient Temperature : (31.0 to 32.0) °C

Relative Humidity : (55 to 60) %

Line Voltage : (210.0 to 210.8) V

**Date of Received :** 23 August 2023

**Date of Calibration :** 23 August 2023

**Date of Issue :** 23 August 2023

**Calibrated by :** Permpon Chanpu

**Calibration Method :** CAL-M4004, TLAS G-20

The temperature scale used was based on ITS-90

**Reference Standard Instruments :** This certification is traceable to the International System of Units

Standard Digital Thermometer with Thermocouple probe

ID No.

Cert. No.

Due Date

Traceability

400029 & 400032 66-400228-1

25 Oct 2023

National Institute of Metrology Thailand (NIMT)

Approved by :

Supervisor

The Uncertainties are for a confidence probability of approximately 95%

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## Certificate of Calibration

**Certificate No. : 66-400476-1**

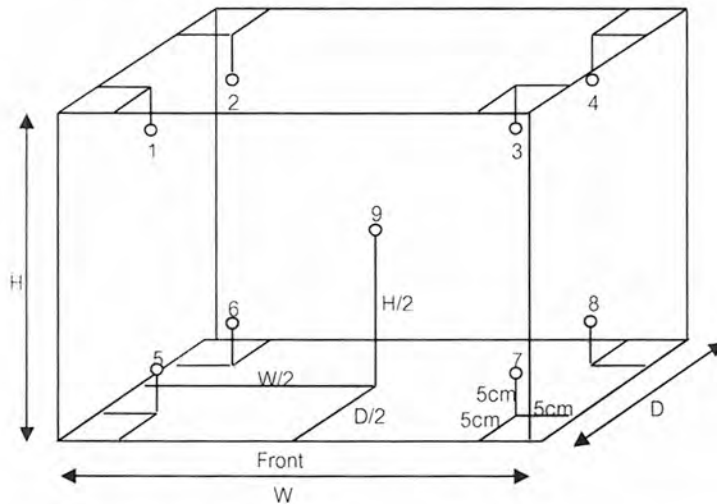
**Page : 2 of 2**

**Result of Calibration :** Without Adjustment

**UUC Condition As-Received :** Good

**Function :** Temperature measurement

This instrument was setting air ventilation at position 0 (close)



Inside of Chamber

W = 0.32 m

D = 0.18 m

H = 0.24 m

Capacity = 0.01 m<sup>3</sup>

| Test Point<br>( ° C ) | Setting Temperature<br>( ° C ) | Indicating Temperature<br>( ° C ) | Measured Temperature ( ° C ) @ Sensor No. |       |       |       |       |       |       |       |       | Uncertainty<br>( ± ° C ) |
|-----------------------|--------------------------------|-----------------------------------|-------------------------------------------|-------|-------|-------|-------|-------|-------|-------|-------|--------------------------|
|                       |                                |                                   | 1                                         | 2     | 3     | 4     | 5     | 6     | 7     | 8     | 9     |                          |
| 180.0                 | 180.0                          | 180.0                             | 181.7                                     | 180.1 | 180.5 | 180.7 | 181.5 | 181.7 | 181.3 | 181.4 | 180.1 | 0.95                     |

| Test Point<br>( ° C ) | Setting Temperature<br>( ° C ) | Indicating Temperature<br>( ° C ) | Measured Uniformity<br>( ° C ) | Measured Stability<br>( ° C ) | Overall Variation<br>( ° C ) |
|-----------------------|--------------------------------|-----------------------------------|--------------------------------|-------------------------------|------------------------------|
| 180.0                 | 180.0                          | 180.0                             | 1.7                            | 0.2                           | 2.0                          |

**Remark** The uncertainty is not combine uniformity of the air chamber

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

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

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## Certificate of Calibration

**Certificate No. :** 66-400476-4 **Page : 1 of 2**

**Submitted by :** M E T Company Limited  
36/659 Moo 6, T.Bangrakpattana, A.Bangbuatong, Nonthaburi 11110

**Equipment :** Air Chamber (Refrigerator)  
Manufacturer : Sanden Intercool Model : YPR-068S  
Range : N/A °C Resolution : 1 °C  
Serial No. : YPR0682S-140100003R ID No. : MET-RE02/57

**Environment :** On site calibration was carried out at the Laboratory, M E T Company Limited  
Ambient Temperature : (29.5 to 30.5) °C  
Relative Humidity : (54 to 57) %  
Line Voltage : (220.5 to 221.8) V

**Date of Received :** 23 August 2023

**Date of Calibration :** 23 August 2023

**Date of Issue :** 23 August 2023

**Calibrated by :** Bunjerd Masri

**Calibration Method :** CAL-M4004, TLAS G-20

The temperature scale used was based on ITS-90

**Reference Standard Instruments :** This certification is traceable to the International System of Units  
Standard Digital Thermometer with Thermocouple probe

| ID No.          | Cert. No.   | Due Date    | Traceability                                    |
|-----------------|-------------|-------------|-------------------------------------------------|
| 400046 & 400023 | 66-400184-1 | 03 Oct 2023 | National Institute of Metrology Thailand (NIMT) |

Approved by :



Supervisor

The Uncertainties are for a confidence probability of approximately 95%

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## Certificate of Calibration

**Certificate No. : 66-400476-4**

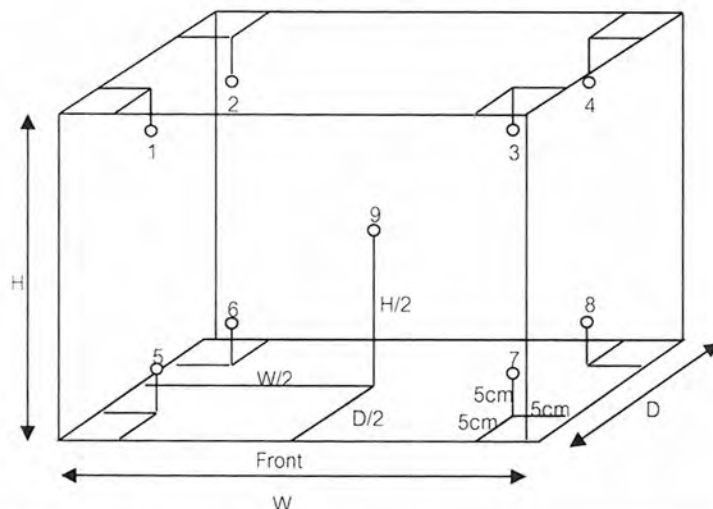
**Page : 2 of 2**

**Result of Calibration :** Without Adjustment

**UUC Condition As-Received :** Good

**Function :** Temperature measurement

This instrument was setting air ventilation at position 0 (close)



Inside of Chamber

W = 0.58 m

D = 0.60 m

H = 1.45 m

Capacity = 0.50 m<sup>3</sup>

| Test Point<br>(°C) | Setting Temperature<br>(°C) | Indicating Temperature<br>(°C) | Measured Temperature (°C) @ Sensor No. |     |     |     |     |     |     |     |     | Uncertainty<br>(± °C) |
|--------------------|-----------------------------|--------------------------------|----------------------------------------|-----|-----|-----|-----|-----|-----|-----|-----|-----------------------|
|                    |                             |                                | 1                                      | 2   | 3   | 4   | 5   | 6   | 7   | 8   | 9   |                       |
| 3                  | 2                           | 2                              | 4.4                                    | 3.7 | 4.3 | 3.9 | 4.1 | 4.3 | 3.9 | 4.2 | 3.2 | 0.89                  |

| Test Point<br>(°C) | Setting Temperature<br>(°C) | Indicating Temperature<br>(°C) | Measured Uniformity<br>(°C) | Measured Stability<br>(°C) | Overall Variation<br>(°C) |
|--------------------|-----------------------------|--------------------------------|-----------------------------|----------------------------|---------------------------|
| 3                  | 2                           | 2                              | 1.5                         | 0.3                        | 1.7                       |

**Remark** The uncertainty is not combine uniformity of the air chamber

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

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

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# Packing List

Unit : K-446 Kjeldigester standard



151111112791000281006111

Serial Number 1000281006

Page 1(1)

| Item     | Pieces | Description                                                                      |  |      |
|----------|--------|----------------------------------------------------------------------------------|--|------|
| 11059833 | 1.0000 | Packing parts Kjeldigester K-446/K-449<br>Beipackteile K-446/K-449               |  | ✓ OK |
| 037377   | 5.0000 | Sample tubes 300 ml (set of 4)<br>Probengläser 300 ml (Set à 4 Stück)            |  | ✓ OK |
| 11059754 | 1.0000 | Rack 20 cpl.<br>Rack 20 kpl.                                                     |  | ✓ OK |
| 11058955 | 1.0000 | Aspiration device Kjeldigester K-446/K-449 cpl.<br>Absaugeinheit K-446/K-449     |  | ✓ OK |
| 040444   | 1.0000 | Weighing boat 20pcs.<br>Wägeschiffchen 20 Stk.                                   |  | ✓ OK |
| 010020   | 1.0000 | Power cable type USA, 3 pole 120V<br>Anschlusskabel USA W 120V                   |  | ✓ OK |
| 11058825 | 1.0000 | Fume collection tube with ball joint<br>Dampfsammelrohr mit Kugelschliff         |  | ✓ OK |
| 11592548 | 1.0000 | Kjeldahl Practice Guide en<br>Kjeldahl Practice Guide en                         |  | ✓ OK |
| 11593546 | 1.0000 | Operation Manual K-446/K-449 english<br>Bedienungsanleitung K-446/K-449 englisch |  | ✓ OK |
| 11593635 | 1.0000 | Supplementary sheet Kjeldigester K-446/K-449<br>Beiblatt K-446/K-449             |  | ✓ OK |

Packed by





## BUCHI Certificate Final Test Inspection

Unit : BÜCHI Kjeldigester K-446

Serial number 1000281006

### Examination Procedure

1. **Visual control of the glass parts and the unit**

✓ OK

- No scratches on the coated surface
- Mounted in accordance to the specific drawing

2. **Security tests**

✓ OK

- High voltage test in accordance with EN 61010-1 (IEC 1010)
- Ground connection test in accordance with EN 61010-1 (IEC 1010)

3. **Functional tests**

**Operating panel**

✓ OK

- All buttons are working
- Cooling system is working after the instrument has been switched on

**Connector plugs**

✓ OK

- Scrubber connector is working

**Heating element**

✓ OK

- Heating-up temperature 420 °C is reached after 40 minutes
- Temperature calibration at 420 °C (3 measuring points)

4. **Completeness of order checked**

✓ OK

BÜCHI Labortechnik AG hereby declares that this unit is in accordance with the specifications

H.-P. Gohn, Quality Manager

Signature, Date:

# Packing List

Unit : K-415 TripleScrub 230V



151111112781000281005111

Serial Number

1000281005

Page 1(1)

| Item     | Pieces | Description                                                          |                                                                                       |      |
|----------|--------|----------------------------------------------------------------------|---------------------------------------------------------------------------------------|------|
| 11057332 | 1.0000 | Tray for adsorption storage<br>Ablage für Adsorption                 |    | ✓ OK |
| 048355   | 1.0000 | Silicone hose D6/9 L=3m<br>Silikonschlauch D6/9 L=3.0m               |    | ✓ OK |
| 033701   | 1.0000 | Glass wool 30g<br>Glaswolle 30g                                      |    | ✓ OK |
| 028737   | 2.0000 | Hose clamp<br>Anschlussklemme                                        |    | ✓ OK |
| 11064971 | 1.0000 | Activated Charcoal 2-6mm, 150g<br>Aktivkohle 2-6mm, 150g             |   | ✓ OK |
| 010020   | 1.0000 | Power cable type USA, 3 pole 120V<br>Anschlusskabel USA W 120V       |  | ✓ OK |
| 11593505 | 1.0000 | Operation Manual K-415 english<br>Bedienungsanleitung K-415 englisch |  | ✓ OK |

Packed by





## BUCHI Certificate Final Test Inspection

Unit : BÜCHI Scrubber K-415

Serial number 1000281005

### Examination Procedure

1. **Visual control of the glass parts and the unit**

✓ OK

- No scratches or splinters on the glass parts
- Mounted in accordance to the specific drawing

2. **Security tests**

✓ OK

- High voltage test in accordance with EN 61010-1 (IEC 1010)
- Ground connection test in accordance with EN 61010-1 (IEC 1010)

3. **Functional tests**

**Vacuum test**

✓ OK

- Bypass valve open: Pressure is 0 - 65 mbar below the atmospheric pressure
- Bypass valve closed: Pressure is 400 mbar (+/- 10 %) below the atmospheric pressure

4. **Completeness of order checked**

✓ OK

BÜCHI Labortechnik AG hereby declares that this unit is in accordance with the specifications



H.-P. Gohn, Quality Manager

Signature, Date:



# Packing List

Unit : K-360 Plastik Basic



151111113001000281014111

Serial Number

1000281014

Page 1(1)

| Item     | Pieces | Description                                                          |                                                                                      |    |
|----------|--------|----------------------------------------------------------------------|--------------------------------------------------------------------------------------|----|
| 043410   | 3.0000 | Canister 10L thin-walled<br>Kanister 10L dünnwandig                  |   | OK |
| 043603   | 1.0000 | Packing parts K-360<br>Beipackteile K-360                            |   | OK |
| 047871   | 1.0000 | Suppl. sheet distillation unit<br>Beiblatt Distillation Unit         |   | OK |
| 010020   | 1.0000 | Power cable type USA, 3 pole 120V<br>Anschlusskabel USA W 120V       |   | OK |
| 11592548 | 1.0000 | Kjeldahl Practice Guide en<br>Kjeldahl Practice Guide en             |   | OK |
| 093176   | 1.0000 | Operation Manual K-360 english<br>Bedienungsanleitung K-360 englisch |  | OK |

Packed by





## BUCHI Certificate Final Test Inspection

Unit : BÜCHI BÜCHI Kjelflex K-360

Serial number 1000281014

### Examination Procedure

1. **Visual control of the glass parts and the unit** ✓ OK

- No scratches on the coated surface or splinters on the glass parts
- Mounted in accordance to the specific drawing

2. **Security tests** ✓ OK

- High voltage test in accordance with EN 61010-1:2002 (IEC 61010-1, VDE 0411)
- Ground connection test in accordance with EN 61010-1:2002 (IEC 61010-1, VDE 0411)
- Safety door sensor checked

3. **Functional tests**  
**Electronics** ✓ OK

- Electronic modul is tested with the checking device PG157
- Connector plugs are working

**Operating panel** ✓ OK

- Display is working
- All buttons of the keypad are working

**Pump testing** ✓ OK

- All pumps are working
- All pumps (exception: water pump of the steam generator) are precalibrated

**Valve testing** ✓ OK

- All valves are working

**Steam generator testing** ✓ OK

- The steam generator is filled with water
- The steam generator valve is working
- The amount of distillate corresponds to specifications

**Further testing** ✓ OK

- Beeper is working

4. **Unit configuration and completeness of order checked** ✓ OK

BÜCHI Labortechnik AG hereby declares that this unit is in accordance with the specifications



H.-P. Gohn, Quality Manager

Signature, Date:



## Certificate of Calibration

**Certificate No. :** 66-300123-4

**Page :** 1 of 2

**Submitted by :** M E T Company Limited

36/659 Moo 6, T. Bangrakpattana, A. Bangbuatong, Nonthaburi 11110

**Equipment :** Burette

Manufacturer : TS

Class : A

Capacity : 10 ml

Graduation : 0.02 ml

ID No. : MET-BU10:02/64

**Environment :** Ambient Temperature :  $(23 \pm 2)$  °C

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

Air Pressure : 1015.1 mbar.

**Date of Received :** 02 March 2023

**Date of Calibration :** 09 March 2023

**Date of Issue :** 09 March 2023

**Calibrated by :** Arcerat Sombun

**Calibration Method :** In-house method CAL-M3001 based on ASTM E 542-01

**Reference Standard Instruments :** This certification is traceable to the International System of Units

Electronic Balance

| ID No. | Cert. No.   | Due Date    | Traceability                                      |
|--------|-------------|-------------|---------------------------------------------------|
| 241005 | 65-200370-4 | 02 Jun 2023 | National Institute of Metrology (Thailand) (NIMT) |

Approved by :



Supervisor

The Uncertainties are for a confidence probability of approximately 95%

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## Certificate of Calibration

**Certificate No. :** 66-300123-4

**Page : 2 of 2**

**Result of Calibration :** This result of true Volume is referred to standard temperature at 20 °C

**UUC Condition As-Received :** Good

Delivery Time : 36.97 sec.

| Nominal Volume ( ml ) | Measuring Volume ( ml ) |
|-----------------------|-------------------------|
| 2                     | 2.0008                  |
| 5                     | 5.0035                  |
| 10                    | 10.0072                 |

Uncertainty of measurement with in  $\pm$  0.0039 ml

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

This reported uncertainty of measurement was based on a standard uncertainty multiplied by a coverage factor  $k = 2.00$  ,  
providing a level of confidence of approximately 95%

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www.calibratech.co.th

List Certificate of Laboratory Instrument

| No. | Instrument/Equipment | Parameter                                                             | Manufacturer | Model/Serial No.       | Calibrator                                           | Certification No. | Date of Calibration | Due date of Calibration* | Remark |
|-----|----------------------|-----------------------------------------------------------------------|--------------|------------------------|------------------------------------------------------|-------------------|---------------------|--------------------------|--------|
| 1   | Incubator            | Clostridium perfringens (C.perfringens)<br>Escherichia coli (E.coli ) | Memmert      | IPP 260 /<br>V616.0066 | Technology Promotion Association<br>(Thailand-Japan) | 23TM728           | 27 Apr 23           | 25 Apr 24                | -      |
| 2   | Incubator            | Salmonella spp.<br>Staphylococcus aureus (S.aureus)                   | Memmert      | IPP 260 /<br>V615.0187 | Technology Promotion Association<br>(Thailand-Japan) | 23TM378           | 12 Apr 23           | 10 Apr 24                | -      |
| 3   | Incubator            | Coliform Bacteria (TCB)                                               | Binder       | BD 53 /<br>13-07343    | Technology Promotion Association<br>(Thailand-Japan) | 23TM192           | 16 Feb 23           | 15 Feb 24                | -      |
| 4   | Water Bath           |                                                                       | Memmert      | WNE 14 /<br>L414.1407  | Technology Promotion Association<br>(Thailand-Japan) | 23TM374           | 11 Apr 23           | 9 Apr 24                 | -      |
| 5   | Water Bath           |                                                                       | Memmert      | WNE 14 /<br>L414.1410  | Technology Promotion Association<br>(Thailand-Japan) | 23TM377           | 12 Apr 23           | 10 Apr 24                | -      |
| 6   | Water Bath           |                                                                       | Memmert      | WNE 14 /<br>L416.0614  | Technology Promotion Association<br>(Thailand-Japan) | 23TM250           | 16 Feb 23           | 15 Feb 24                | -      |
| 7   | Auto Clave           |                                                                       | ALP          | CL-40L /<br>808763     | Technology Promotion Association<br>(Thailand-Japan) | 23TM763           | 27 Apr 23           | 25 Apr 24                | -      |
| 8   | Auto Clave           |                                                                       | ALP          | CL-40L /<br>810010     | DKSH (Thailand) Ltd.                                 | C11230106         | 9 Jun 23            | 7 Jun 24                 | -      |
| 9   | Analytical Balance   |                                                                       | OHAUS        | PX623 /<br>C236754745  | DKSH (Thailand) Ltd.                                 | C01223732         | 9 Dec 22            | 8 Dec 23                 | -      |

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

เอกสารไม่ควบคุม



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



Cert. No.: 23TM728

Page : 1 of 3

## Certificate of Calibration

**Equipment :** Incubator

**Manufacturer :** Memmert

**Model :** IPP 260

**Serial No. :** V616.0066

**ID No. :** UAE.MIC.032/2559

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

**Location :** Microbiology Laboratory (302)

**Received Order :** 27 April 2023

**Calibration Date :** 27 - 28 April 2023

**Ambient Temperature :** (  $26 \pm 10$  ) °C

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

**Calibrated by :** Tawatchai Pama

**Approved by :**

Approved Signatory

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

**Issue Date :** 11 May 2023

The Uncertainties are for a confidence probability of approximately 95%

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Equipment : Incubator  
Condition As-Received : Used Item  
Reference : 2304-0461OC-6  
Result of Calibration :- ( \* ) Without Adjustment  
Function of UUC\* : Temperature Source  
Fresh air setting : Close

Cert. No.: 23TM728

Page : 3 of 3

| Calibration Point<br>( °C ) | UUC* Setting<br>( °C ) | UUC* Reading<br>( °C ) | Temperature stability<br>( ± °C ) | Temperature uniformity<br>( °C ) | Overall Variation<br>( °C ) | Coverage Factor<br><i>k</i> |
|-----------------------------|------------------------|------------------------|-----------------------------------|----------------------------------|-----------------------------|-----------------------------|
| 25.0                        | 25.0                   | 25.0                   | 0.020                             | 0.81                             | 1.2                         | 2                           |
| 36.0                        | 36.0                   | 36.0                   | 0.15                              | 1.1                              | 1.6                         | 2                           |

| Calibration<br>Point<br>( °C ) | Measured Temperature ( °C ) |        |        |        |        |        |        |        |          | Uncertainty<br><br>( ± °C ) |
|--------------------------------|-----------------------------|--------|--------|--------|--------|--------|--------|--------|----------|-----------------------------|
|                                | Position                    |        |        |        |        |        |        |        |          |                             |
|                                | 1                           | 2      | 3      | 4      | 5      | 6      | 7      | 8      | 9 (ref.) |                             |
| 25.0                           | 25.541                      | 25.354 | 25.388 | 25.278 | 24.341 | 24.349 | 24.379 | 24.455 | 24.747   | 0.30                        |
| 36.0                           | 35.275                      | 35.351 | 35.768 | 35.941 | 36.543 | 36.590 | 36.653 | 36.728 | 36.232   | 0.39                        |

**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 %.

-o0o-

เอกสารไม่ควรรักษา



Equipment : Incubator  
Condition As-Received : Used Item  
Reference : 2304-0461OC-6

Cert. No.: 23TM728

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:-

| <u>Instrument</u>    | <u>Model</u> | <u>Serial No.</u> | <u>Cert. No.</u> | <u>Due Date</u> |
|----------------------|--------------|-------------------|------------------|-----------------|
| 1 ) Data Acquisition | 34972A       | MY57013711        | 22LM93           | 02 Jul 2023     |

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

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

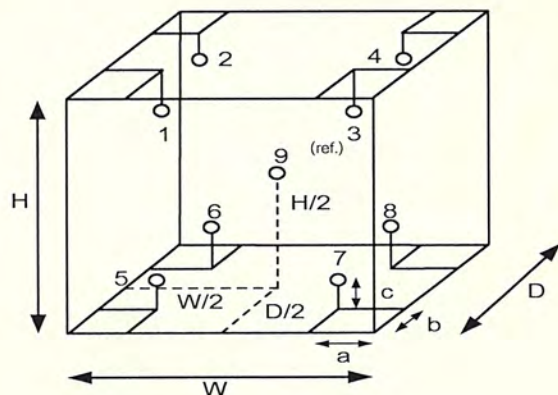
**Result of Calibration :-** ( \* ) Without Adjustment

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

**Fresh air setting :** Close

**Environment during calibration**

|                    | <b>Beginning</b> | <b>Finished</b> |
|--------------------|------------------|-----------------|
| Temp. ( °C )       | 25               | 22              |
| REL.Humid. ( % )   | 76               | 83              |
| AC Supply ( Volt ) | 231              | 231             |



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

**Probe Installation Details :**

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

**Dimension of Chamber :**

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

เอกสารไม่ควน



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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

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

**Issue Date :** 24 April 2023

The Uncertainties are for a confidence probability of approximately 95%

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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.

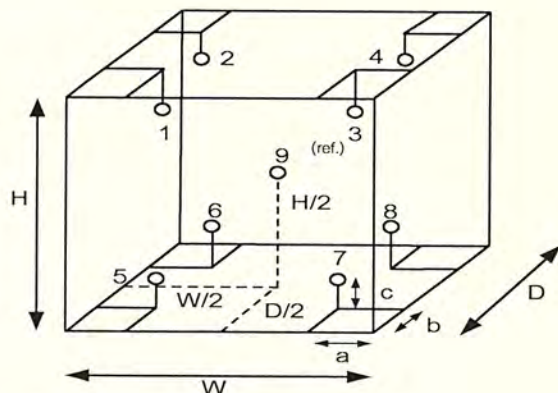
**Result of Calibration :-** ( \* ) Without Adjustment

**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 m<sup>3</sup>

เอกสารไม่ค



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<br>( °C ) | UUC* Setting<br>( °C ) | UUC* Reading<br>( °C ) | Temperature stability<br>( ± °C ) | Temperature uniformity<br>( °C ) | Overall Variation<br>( °C ) | Coverage Factor<br><i>k</i> |
|-----------------------------|------------------------|------------------------|-----------------------------------|----------------------------------|-----------------------------|-----------------------------|
| 35.0                        | 35.0                   | 35.0                   | 0.052                             | 0.53                             | 0.60                        | 2                           |

| Calibration<br>Point<br>( °C ) | Measured Temperature ( °C ) |        |        |        |        |        |        |        |          | Uncertainty<br><br>( ± °C ) |
|--------------------------------|-----------------------------|--------|--------|--------|--------|--------|--------|--------|----------|-----------------------------|
|                                | Position                    |        |        |        |        |        |        |        |          |                             |
|                                | 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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TEL. 0-2717-3000-29 FAX. 0-2719-9484



Cert. No.: 23TM192

Page : 1 of 3

## Certificate of Calibration

**Equipment :** Incubator

**Manufacturer :** Binder

**Model :** BD 53 E2

**Serial No. :** 13-07343

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

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

**Location :** Microbiology Laboratory

**Received Order :** 15 February 2023

**Calibration Date :** 15 February 2023

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

**Relative Humidity :** ( 50 ± 30 ) %

**Calibrated by :** Suwit Imjai

**Approved by :**

Approved Signatory

( ) Pornthippa Tameyakul

( / ) Malee Butkruea

**Issue Date :** 24 February 2023

The Uncertainties are for a confidence probability of approximately 95%

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

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Equipment : Incubator  
Condition As-Received : Used Item  
Reference : 2302-0295OC-1

Cert. No.: 23TM192

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:-

| <u>Instrument</u>    | <u>Model</u> | <u>Serial No.</u> | <u>Cert. No.</u> | <u>Due Date</u> |
|----------------------|--------------|-------------------|------------------|-----------------|
| 1 ) Data Acquisition | 34972A       | MY59003411        | 22LM165          | 26 Nov 2023     |

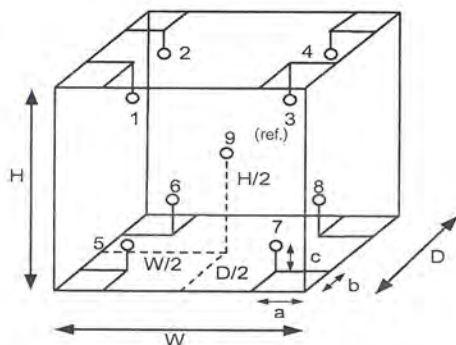
2. This certificate is valid only to the item calibrated on date and place of calibration.

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

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

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

**Fresh air setting :** Close



| Environment during calibration |           |          |
|--------------------------------|-----------|----------|
|                                | Beginning | Finished |
| Temp. ( °C )                   | 22        | 23       |
| REL.Humid. ( % )               | 65        | 61       |
| AC Supply ( Volt )             | 231       | 231      |

| 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         |

**Probe Installation Details :**

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

**Dimension of Chamber :**

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

เอกสารไม่ควม...



Equipment : Incubator  
Condition As-Received : Used Item  
Reference : 2302-0295OC-1  
**Result of Calibration :-** ( \* ) Without Adjustment  
Function of UUC\* : Temperature Source  
Fresh air setting : Close

Cert. No.: 23TM192

Page : 3 of 3

| Calibration Point<br>( °C ) | UUC* Setting<br>( °C ) | UUC* Reading<br>( °C ) | Temperature stability<br>( ± °C ) | Temperature uniformity<br>( °C ) | Overall Variation<br>( °C ) | Uncertainty<br>( ± °C ) | Coverage Factor<br><i>k</i> |
|-----------------------------|------------------------|------------------------|-----------------------------------|----------------------------------|-----------------------------|-------------------------|-----------------------------|
| 35.0                        | 35.4                   | 35.4                   | 0.037                             | 0.56                             | 0.86                        | 0.30                    | 2                           |

| Calibration Point<br>( °C ) | Measured Temperature ( °C ) |        |        |        |        |        |        |        |          |
|-----------------------------|-----------------------------|--------|--------|--------|--------|--------|--------|--------|----------|
|                             | Position                    |        |        |        |        |        |        |        |          |
|                             | 1                           | 2      | 3      | 4      | 5      | 6      | 7      | 8      | 9 (ref.) |
| 35.0                        | 35.256                      | 35.308 | 35.116 | 35.453 | 34.700 | 34.798 | 34.718 | 34.657 | 34.938   |

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

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

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

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

**UUC\*** : Unit Under Calibration

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

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

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



Cert. No.: 23TM374  
Page : 1 of 3

## Certificate of Calibration

**Equipment :** Water Bath  
**Manufacturer :** Memmert  
**Model :** WNE 14  
**Serial No. :** L414.1407  
**ID No. :** UAE.MIC.006/2558  
**Submitted by :** United Analyst and Engineering Consultant Co.,Ltd.  
3 Soi Udomsuk 41, Sukhumvit Road,  
Bangchak, Phrakhanong,  
Bangkok 10260  
**Location :** Microbiology Laboratory  
**Received Order :** 11 April 2023  
**Calibration Date :** 11 April 2023  
**Ambient Temperature :** ( 26 ± 10 ) °C  
**Relative Humidity :** ( 50 ± 30 ) %

**Calibrated by :** Krisda Malee

**Approved by :**

Approved Signatory

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

**Issue Date :** 24 April 2023

The Uncertainties are for a confidence probability of approximately 95%

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Equipment : Water Bath  
Condition As-Received : Used Item  
Reference : 2304-0155OC-3  
Result of Calibration :- ( \* ) Without Adjustment  
Function of UUC\* : Temperature Source

Cert. No.: 23TM374

Page : 3 of 3

| Calibration<br>point<br>( °C ) | UUC*<br>Setting<br>( °C ) | UUC*<br>Reading<br>( °C ) | Average* Standard Reading ( °C ) |        |        |        |          | Uncertainty<br><br>( ± °C ) |
|--------------------------------|---------------------------|---------------------------|----------------------------------|--------|--------|--------|----------|-----------------------------|
|                                |                           |                           | Position                         |        |        |        |          |                             |
|                                |                           |                           | 1                                | 2      | 3      | 4      | 5 (ref.) |                             |
| 44.5                           | 44.5                      | 44.5                      | 44.508                           | 44.466 | 44.456 | 44.478 | 44.483   | 0.15                        |

| Calibration<br>point<br>( °C ) | Uniformity<br>( °C ) | Stability<br>( ± °C ) | Coverage<br>Factor<br><i>k</i> |
|--------------------------------|----------------------|-----------------------|--------------------------------|
| 44.5                           | 0.065                | 0.031                 | 2                              |

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

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

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

**UUC\*** : Unit Under Calibration

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

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

-o0o-

เอกสารไม่ควน



Equipment : Water Bath  
Condition As-Received : Used Item  
Reference : 2304-0155OC-3

Cert. No.: 23TM374

Page : 2 of 3

**Procedure Used :-**

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

The temperature scale used was based on ITS-90.

**Condition of this result of calibration**

1. Reference standard instrument:-

| <u>Instrument</u>    | <u>Model</u> | <u>Serial No.</u> | <u>Cert. No.</u> | <u>Due Date</u> |
|----------------------|--------------|-------------------|------------------|-----------------|
| 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.

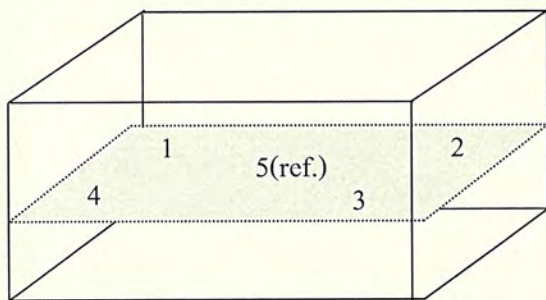
3. This certification is traceable to the International System of Unit.

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

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

**Heat transfer medium used :** Water

|                          | <u>Environmental</u> |           | <u>AC Voltage Supply</u> |
|--------------------------|----------------------|-----------|--------------------------|
|                          | ( °C )               | ( %R.H. ) | ( Volt )                 |
| Beginning of Calibration | 26                   | 55        | 220                      |
| Finished of Calibration  | 25                   | 56        | 221                      |



Front

| <u>Position :</u> | <u>Ref. Std. ID No.:</u> |
|-------------------|--------------------------|
| 1                 | 4804539-001              |
| 2                 | 4804539-002              |
| 3                 | 4804539-003              |
| 4                 | 4804539-004              |
| 5(ref.)           | 4804539-005              |

เอกสารไม่คว



TECHNOLOGY PROMOTION ASSOCIATION (THAILAND-JAPAN)  
CORPORATE SERVICES 3: EQUIPMENT CALIBRATION AND TESTING SERVICES  
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TEL. 0-2717-3000-29 FAX. 0-2719-9484



Cert. No.: 23TM377

Page : 1 of 3

## Certificate of Calibration

**Equipment :** Water Bath

**Manufacturer :** Memmert

**Model :** WNE 14

**Serial No. :** L414.1410

**ID No. :** UAE.MIC.007/2558

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

**Location :** Microbiology Laboratory (302)

**Received Order :** 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

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

**Issue Date :** 24 April 2023

The Uncertainties are for a confidence probability of approximately 95%

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เอกสารไม่ควบคุม

A 0053356



Equipment : Water Bath  
Condition As-Received : Used Item  
Reference : 2304-0155OC-4  
Result of Calibration :- ( \* ) Without Adjustment  
Function of UUC\* : Temperature Source

Cert. No.: 23TM377  
Page : 3 of 3

| Calibration<br>point<br>( °C ) | UUC*<br>Setting<br>( °C ) | UUC*<br>Reading<br>( °C ) | Average* Standard Reading ( °C ) |        |        |        |          | Uncertainty<br><br>( ± °C ) |
|--------------------------------|---------------------------|---------------------------|----------------------------------|--------|--------|--------|----------|-----------------------------|
|                                |                           |                           | Position                         |        |        |        |          |                             |
|                                |                           |                           | 1                                | 2      | 3      | 4      | 5 (ref.) |                             |
| 44.5                           | 44.5                      | 44.5                      | 44.494                           | 44.459 | 44.477 | 44.507 | 44.498   | 0.15                        |

| Calibration<br>point<br>( °C ) | Uniformity<br>( °C ) | Stability<br>( ± °C ) | Coverage<br>Factor<br><i>k</i> |
|--------------------------------|----------------------|-----------------------|--------------------------------|
| 44.5                           | 0.13                 | 0.056                 | 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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เอกสารไม่ควบคุม

a 1158266



Equipment : Water Bath  
Condition As-Received : Used Item  
Reference : 2304-0155OC-4

Cert. No.: 23TM377

Page : 2 of 3

**Procedure Used :-**

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

The temperature scale used was based on ITS-90.

**Condition of this result of calibration**

1. Reference standard instrument:-

| <u>Instrument</u>    | <u>Model</u> | <u>Serial No.</u> | <u>Cert. No.</u> | <u>Due Date</u> |
|----------------------|--------------|-------------------|------------------|-----------------|
| 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.

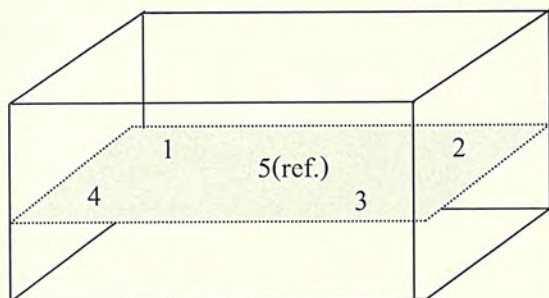
3. This certification is traceable to the International System of Unit.

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

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

**Heat transfer medium used :** Water

|                          | <u>Environmental</u> |           | <u>AC Voltage Supply</u> |
|--------------------------|----------------------|-----------|--------------------------|
|                          | ( °C )               | ( %R.H. ) | ( Volt )                 |
| Beginning of Calibration | 27                   | 65        | 220                      |
| Finished of Calibration  | 30                   | 70        | 221                      |



Front

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

เอกสารไม่ควบคุม

a 1158267



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



Cert. No.: 23TM250

Page : 1 of 3

## Certificate of Calibration

**Equipment :** Water Bath

**Manufacturer :** Memmert

**Model :** WNE 14

**Serial No. :** L416.0614

**ID No. :** UAE.MIC.020/2561

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

**Location :** Microbiology Laboratory

**Received Order :** 15 February 2023

**Calibration Date :** 16 February 2023

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

**Relative Humidity :** ( 50 ± 30 ) %

**Calibrated by :** Preecha Hlahib

**Approved by :**

Approved Signatory

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

**Issue Date :** 24 February 2023

The Uncertainties are for a confidence probability of approximately 95%

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Equipment : Water Bath  
Condition As-Received : Used Item  
Reference : 2302-0295OC-4  
**Result of Calibration :-** ( \* ) Without Adjustment  
**Function of UUC\* :** Temperature Source

Cert. No.: 23TM250

Page : 3 of 3

| Calibration<br>point<br>( °C ) | UUC*<br>Setting<br>( °C ) | UUC*<br>Reading<br>( °C ) | Average* Standard Reading ( °C ) |        |        |        |          |
|--------------------------------|---------------------------|---------------------------|----------------------------------|--------|--------|--------|----------|
|                                |                           |                           | Position                         |        |        |        |          |
|                                |                           |                           | 1                                | 2      | 3      | 4      | 5 (ref.) |
| 44.5                           | 44.4                      | 44.4                      | 44.482                           | 44.458 | 44.461 | 44.461 | 44.460   |
| 50.0                           | 50.0                      | 50.0                      | 50.087                           | 50.061 | 50.066 | 50.064 | 50.068   |

| Calibration<br>point<br>( °C ) | Uniformity<br>( °C ) | Stability<br>( ± °C ) | Uncertainty<br>( ± °C ) | Coverage<br>Factor<br><i>k</i> |
|--------------------------------|----------------------|-----------------------|-------------------------|--------------------------------|
| 44.5                           | 0.058                | 0.030                 | 0.15                    | 2                              |
| 50.0                           | 0.058                | 0.036                 | 0.15                    | 2                              |

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

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

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

**UUC\*** : Unit Under Calibration

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

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

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เอกสารไม่ควบคุม



Equipment : Water Bath  
Condition As-Received : Used Item  
Reference : 2302-0295OC-4

Cert. No.: 23TM250

Page : 2 of 3

**Procedure Used :-**

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

The temperature scale used was based on ITS-90.

**Condition of this result of calibration**

1. Reference standard instrument:-

| <u>Instrument</u>    | <u>Model</u> | <u>Serial No.</u> | <u>Cert. No.</u> | <u>Due Date</u> |
|----------------------|--------------|-------------------|------------------|-----------------|
| 1 ) Data Acquisition | 34972A       | MY59003411        | 22LM165          | 26 Nov 2023     |

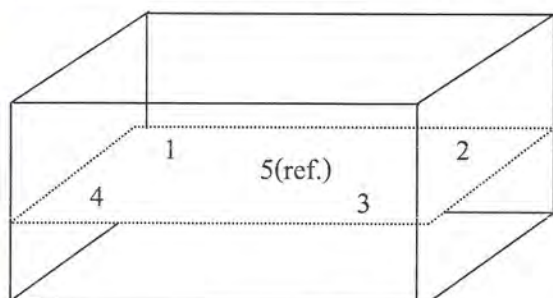
2. This certificate is valid only to the item calibrated on date and place of calibration.

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

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

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

|                          | Environmental |           | AC Voltage Supply |
|--------------------------|---------------|-----------|-------------------|
|                          | ( °C )        | ( %R.H. ) | ( Volt )          |
| Beginning of Calibration | 22            | 55        | 220               |
| Finished of Calibration  | 23            | 58        | 221               |



Front

| Position : | Ref. Std. ID No.: |
|------------|-------------------|
| 1          | 4804539-001       |
| 2          | 4804539-002       |
| 3          | 4804539-003       |
| 4          | 4804539-004       |
| 5(ref.)    | 4804539-005       |

เอกสารไม่คว



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.: 23TM763

Page : 1 of 3

## Certificate of Calibration

**Equipment :** Autoclave

**Manufacturer :** ALP

**Model :** CL-40L

**Serial No. :** 808763

**ID No. :** UAE.MIC.026/2563

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

**Location :** Microbiology Laboratory (301)

**Received Order :** 27 April 2023

**Calibration Date :** 27 April 2023

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

**Relative Humidity :** ( 50 ± 30 ) %

**Calibrated by :** Preecha Hlahib

**Approved by :**



Approved Signatory

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

**Issue Date :** 11 May 2023

The Uncertainties are for a confidence probability of approximately 95%

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

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A 0053944



**Equipment :** Autoclave  
**Condition As-Received :** Used Item  
**Reference :** 2304-04610C-2

**Cert. No.:** 23TM763

**Page :** 2 of 3

**Procedure Used :-**

Calibration were conducted using in-house calibration procedure CP-OT03 according to direct measurement method with Data Acquisition which connected with Thermocouple Type T

The temperature scale used was based on ITS-90.

**Condition of this result of calibration**

1. Reference standard instrument:-

| <u>Instrument</u>    | <u>Model</u> | <u>Serial No.</u> | <u>Cert. No.</u> | <u>Due Date</u> |
|----------------------|--------------|-------------------|------------------|-----------------|
| 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.

4. This result of calibration covers laboratory autoclaves for the sterilization of goods and material which could be infected with organisms categorized as Hazard Group 1, 2 and 3\*\*

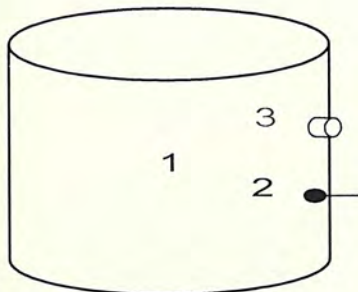
(\*\* = Categorization of pathogens according to hazard and categories of containment, second edition, 1990 )

It does not cover autoclaves for use with material infect with organisms in Hazard Group 4, for which complete containment and sterilization of infected condensate is considered to be essential.

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

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

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



|                          | Environmental |           |          |
|--------------------------|---------------|-----------|----------|
|                          | ( °C )        | ( %R.H. ) | ( Volt ) |
| Beginning of Calibration | 27            | 60        | 220      |
| Finished of Calibration  | 27            | 58        | 220      |

| <u>Position</u> | <u>Description</u> | <u>Ref. Std. ID No.:</u> |
|-----------------|--------------------|--------------------------|
| 1 =             | Center of chamber  | 18-20TC-04               |
| 2 =             | Temperature sensor | 18-20TC-05               |
| 3 =             | Exhaust port       | 18-20TC-06               |

เอกสารไม่ควบคุม

a 1159968



Equipment : Autoclave  
Condition As-Received : Used Item  
Reference : 2304-0461OC-2  
Result of Calibration :- ( \* ) Without Adjustment  
Function of UUC\* : Temperature Source

Cert. No.: 23TM763

Page : 3 of 3

Operating parameter Set : Temperature = 115.0 °C  
Sterilization period = 15 minute

| UUC*<br>Setting<br>( °C ) | UUC*<br>Reading<br>( °C ) | Position | Average*<br>Standard Reading<br>( °C ) | Stability<br>( ± °C ) | Pressure<br>Reading<br>( MPa ) | Uncertainty<br>( ± °C ) | Coverage<br>Factor<br><i>k</i> |
|---------------------------|---------------------------|----------|----------------------------------------|-----------------------|--------------------------------|-------------------------|--------------------------------|
| 115.0                     | 115.0                     | 1        | 115.213                                | 0.22                  | 0.08                           | 0.75                    | 2                              |
|                           |                           | 2        | 115.166                                |                       |                                |                         |                                |
|                           |                           | 3        | 115.260                                |                       |                                |                         |                                |

Operating parameter Set : Temperature = 121.0 °C  
Sterilization period = 30 minute

| UUC*<br>Setting<br>( °C ) | UUC*<br>Reading<br>( °C ) | Position | Average*<br>Standard Reading<br>( °C ) | Stability<br>( ± °C ) | Pressure<br>Reading<br>( MPa ) | Uncertainty<br>( ± °C ) | Coverage<br>Factor<br><i>k</i> |
|---------------------------|---------------------------|----------|----------------------------------------|-----------------------|--------------------------------|-------------------------|--------------------------------|
| 121.0                     | 121.0                     | 1        | 121.260                                | 0.29                  | 1.1                            | 0.75                    | 2                              |
|                           |                           | 2        | 121.224                                |                       |                                |                         |                                |
|                           |                           | 3        | 121.284                                |                       |                                |                         |                                |

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

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

**UUC\*** : Unit Under Calibration

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

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

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เอกสารไม่ควบคุม

a 1159967



# Certificate of Calibration

|                             |              |                         |              |
|-----------------------------|--------------|-------------------------|--------------|
| <b>Equipment:</b>           | Autoclave    | <b>Certificate No.:</b> | C11230106    |
| <b>Model:</b>               | CL-40L       | <b>Issued Date:</b>     | 11 June 2023 |
| <b>Serial No. (or ID.):</b> | 810010       | <b>Job No.:</b>         | KSPR2308770  |
| <b>Manufacturer:</b>        | ALP          | <b>Page:</b>            | 1 of 4       |
| <b>Condition:</b>           | 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 ± 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:** Mr. Amornthep Phumpho

**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

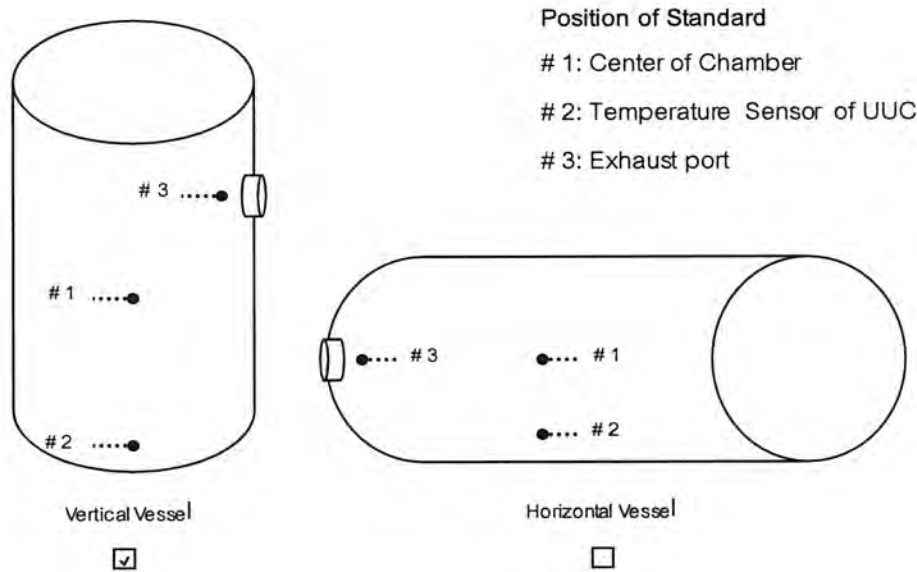


Authorized signatory

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.



### 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.

**Calibration Results:**
**Without adjustment**

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

| Locations | Measured Temperature<br>(°C) | Correction of UUC.<br>(°C) | Uncertainty<br>(± °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<br>(± °C)* |
|-----------------|-----------------|--------------------|-------------------|------------------------------------------|------------|------------|------------------------|
| Desired<br>(°C) | Setting<br>(°C) | Indicating<br>(°C) | Indicating<br>Mpa | #1<br>(°C)                               | #2<br>(°C) | #3<br>(°C) |                        |
| 115             | 115             | 115.0              | 0.08              | 115.34                                   | 115.43     | 115.43     | 0.35                   |

**Chamber Characterization**

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

Note: \* Maximum uncertainty of the each position

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

### Without adjustment

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

| Locations | Measured Temperature<br>(°C) | Correction of UUC.<br>(°C) | Uncertainty<br>(± °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<br>(± °C)* |
|-----------------|-----------------|--------------------|-------------------|------------------------------------------|------------|------------|------------------------|
| Desired<br>(°C) | Setting<br>(°C) | Indicating<br>(°C) | Indicating<br>Mpa | #1<br>(°C)                               | #2<br>(°C) | #3<br>(°C) |                        |
| 121             | 121             | 121.0              | 0.12              | 121.34                                   | 121.40     | 121.26     | 0.35                   |

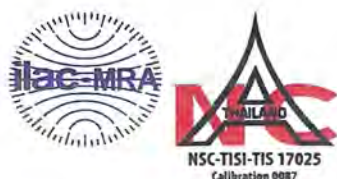
### Chamber Characterization

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

Note: \* Maximum uncertainty of the each position

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

### The End of Certificate



# Certificate of Calibration

|                             |            |                         |                  |
|-----------------------------|------------|-------------------------|------------------|
| <b>Equipment:</b>           | Balance    | <b>Certificate No.:</b> | C01223732        |
| <b>Model:</b>               | PX623      | <b>Issued Date:</b>     | 09 December 2022 |
| <b>Serial No. (or ID.):</b> | C236754745 | <b>Job No.:</b>         | KSPR2215576      |
| <b>Manufacturer:</b>        | Ohaus      | <b>Page:</b>            | 1 of 2           |
| <b>Condition:</b>           | New        |                         |                  |

**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 26 °C ± 0.5 °C  
Humidity 53 %RH ± 3.9 %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:** Mr. Adisai Maknoi

**Calibration Date:** 09 December 2022

**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. C02221765



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:

### Without 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 | 0.000 | 0.000 | 0.000 |

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

| Nominal test value (g) | Standard Deviation |
|------------------------|--------------------|
| 50                     | 0.0004             |
| 500                    | 0.0005             |

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

| Nominal Value<br>(g) | Conventional Mass<br>(g) | Displayed Value<br>(g) | Error of Indication<br>(g) | Uncertainty<br>(g) | k    |
|----------------------|--------------------------|------------------------|----------------------------|--------------------|------|
| 1                    | 1.0000                   | 1.000                  | 0.000                      | 0.0010             | 2.03 |
| 5                    | 5.0001                   | 5.000                  | 0.000                      | 0.0010             | 2.03 |
| 10                   | 10.0001                  | 10.000                 | 0.000                      | 0.0010             | 2.03 |
| 20                   | 20.0001                  | 20.000                 | 0.000                      | 0.0010             | 2.03 |
| 50                   | 50.0001                  | 50.000                 | 0.000                      | 0.0010             | 2.03 |
| 100                  | 100.0001                 | 100.000                | 0.000                      | 0.0011             | 2.03 |
| 200                  | 200.0004                 | 200.000                | 0.000                      | 0.0011             | 2.02 |
| 300                  | 300.0005                 | 300.000                | -0.001                     | 0.0013             | 2.01 |
| 400                  | 400.0008                 | 400.001                | 0.000                      | 0.0014             | 2.01 |
| 500                  | 500.0003                 | 500.000                | 0.000                      | 0.0017             | 2.00 |
| 600                  | 600.0004                 | 600.000                | 0.000                      | 0.0019             | 2.00 |

The End of Certificate