

เอกสารแนบ 6

เอกสารสอบเทียบเครื่องมือที่ใช้ในการวิเคราะห์

Condition of this calibration result

1. Reference Standard Instruments : This certification is traceable to the international unit of unit maintained through:

| Instruments | Model | Serial No. | Certificate No. | Traceable |
|--------------------------------|-----------|------------|-----------------|--|
| Documenting Process Calibrator | Fluke 753 | 43160061 | LP24-0014 | Measuretronix Limited. |
| Thermometer with sensor | HI98509 | 39643D | 23T1453 | Technology Promotion Association (Thailand-Japan). |
| Digital Thermo-Hygrometer | HT-771SD | AL07155 | 24H41 | |

2. Reference Standard Materials : pH calibration standard traceable thru CPA chem Ltd.

| Buffer Solution | Manufacture | Certified Value | Lot Number | Exp. date |
|-----------------|-------------|---|------------|-------------|
| pH 4.0 | CPA chem | $4.008 \pm 0.006 @ 25^{\circ}\text{C}$ | 898494 | 3 June 2024 |
| pH 7.0 | CPA chem | $6.985 \pm 0.007 @ 25^{\circ}\text{C}$ | 898500 | 28 May 2024 |
| pH 10.0 | CPA chem | $10.011 \pm 0.012 @ 25^{\circ}\text{C}$ | 898502 | 24 May 2024 |

Calibration Result :

1. Performing standard curve by Simulator at: -177.5, 0.0, 177.5 mV
(Measurement Electrical Potential) After Adjust Result.

| Unit Under Calibration | Nominal Value | Standard Voltage Input | Actual Reading | | Uncertainty of Measurement (\pm mV) |
|----------------------------|---------------|------------------------|----------------|--------|--|
| | | | pH | mV | |
| pH Meter SN 04160019101 | 4.01 | 177.5 | 4.01 | 177.5 | 0.097 |
| | 7.01 | 0.0 | 7.01 | 0.0 | 0.058 |
| | 10.01 | -177.5 | 10.01 | -177.5 | 0.097 |

2. Performing three buffer standard curve by using buffer nominal : pH 4,7,10 After Adjustment.

| Unit Under Calibration | Standard pH Buffer Solution | Actual Reading (pH) | Actual Reading (mV) | Uncertainty of Measurement (\pm pH) |
|-----------------------------|-----------------------------|---------------------|---------------------|--|
| pH Electrode SN 094430BN | 4.008 | 4.02 | 159.3 | 0.010 |
| | 6.985 | 6.99 | -13.6 | 0.011 |
| | 10.011 | 10.04 | -187.9 | 0.014 |

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

** End of certificate **

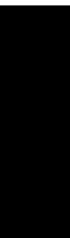
Certificate No. : HIT-2410-0320

Page : 1 of 2

CERTIFICATE OF CALIBRATION

| | | | | |
|-------------------------|---|-------------------|-------------|--|
| Equipment : | pH/mV and EC/TDS/Salinity/Resistivity Meter | | | |
| Meter Model : | HI5521-02 | Serial No. : | 04160019101 | |
| Probe Model : | HI1131B | Serial No. : | 094430BN | |
| Resolution (pH) : | 0.01 | Resolution (mV) : | 0.1 | |
| Manufacturer : | Hanna Instruments | | | |
| Condition As-Received : | Used Product | | | |
| Ambient Temperature : | (25 ± 2) °C | | | |
| Customer name : | Okla Testing & Consulting Service Co., Ltd. | | | |
| | (50 ± 15)% RH | | | |

Calibrated by :



Approved by :



Authorized Signatory



This certificate was certified only for the instrument we calibrated.

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

** This certificate may not be reproduced other than in full, except with the prior written **
approval of the head of Hanna Instrument (Thailand)

Result of Calibration: ☒ Without Adjustment ☐ With Adjustment

Calibration Range: 20 °C to 30 °C

Function:

Table 1: This equipment was connected with temperature sensor Model: HI7662-W, S/N: 0615024N.
Dimension: Diameter 3 mm., Length 116 mm.

| Immersion Depth (mm) | Standard Reading (°C) | UUC Reading (°C) | Error (°C) | Uncertainty (°C) |
|-------------------------|--------------------------|---------------------|---------------|---------------------|
| 110 | 20.040 | 20.1 | 0.1 | 0.099 |
| 110 | 25.037 | 25.1 | 0.1 | 0.099 |
| 110 | 30.034 | 30.1 | 0.1 | 0.099 |

UUC*: Unit Under Calibration

End of Certificate of Calibration



CERTIFICATE OF CALIBRATION

Certificate No. : CDT-181-67

Page 1 of 2 Pages

MEASUREMENT ITEM
MANUFACTURER
MODEL/TYPE
SERIAL NUMBER
ID NUMBER
CONDITION AS-RECEIVED
CUSTOMER

: Digital Thermometer with Temperature Sensor
: HANNA INSTRUMENTS
: HI5521
: 04160019101
: -
: Used item
: OKLA Testing and Consulting Service Co., Ltd.
67/35-36 Floor 3, Soi Petchkasem 7/1,
Petchkasem Rd, Watthapra, Bangkokkay, Bangkok 10600.

RECEIVED DATE
MEASUREMENT DATE
ISSUE DATE

: 04 Nov 2024
: 07 Nov 2024
: 11 Nov 2024

ENVIRONMENTAL CONDITIONS:

Ambient condition in the laboratory are as follow:
Temperature : 23.0 ± 3.0 °C
Relative Humidity : 55.0 ± 15.0 %RH

NOTED: The certificate is valid only to the item calibrated on date and place of calibration.

TABULATION OF RESULTS:

The table on next page give the measured values.

Calibration procedure:
The temperature calibration was done by
In-House calibration method as WI-CL-001
according to comparison method with standard
digital temperature indicator and standard
temperature probe. The temperature scale use
was based on ITS-90.

Traceability:
The measurement results are traceable to the
international system of units (SI) through
National Institute of Metrology Thailand (NIMT)
Certificate number: TT-0047-24, Certificate
number: ER-0113-24

Reference Used During Calibration:

1. Standard Temperature Probe
Model: STS-100 AS00, Serial No.: 667682 09,
Due date: 26 Mar 2025
2. Digital Temperature Indicator
Model: DTI-1000-A MK II, Serial No.: 671407-
00591 Due date: 21 Oct 2025

Uncertainty of Measurement:

The reported uncertainty of measurement is
based on the standard uncertainty multiplied by
a coverage factor k=2, Which for a normal
distribution corresponds to a coverage
probability of approximately 95%. The standard
uncertainty has been determined in accordance
with the GUM "Evaluation of measurement data
- Guide to the expression of uncertainty in
measurement"

Calibrated by:

Approved signatory:

Calibration Department Manager

Calibration Results

Certificate No. : WK2402-300-865

Page 2 of 2

Calibration Result of the Accuracy

Function : Dissolved Oxygen Measurement at 25 °C
Resolution : 0.01 mg/L

Unit : mg/L

| STD Solution | UUC Reading | | Error | Uncertainty (± mg/L) |
|--------------|-------------------|------------------|-------|---------------------------|
| | Before Adjustment | After Adjustment | | |
| 0.00 | 0.32 | 0.00 | 0.00 | 0.15 |
| 8.40 | 9.15 | 8.37 | -0.03 | 0.33 |
| 8.70 | 9.01 | 8.65 | -0.05 | 0.33 |
| 9.00 | 9.24 | 8.92 | -0.08 | 0.33 |

() Without Adjustment (X) After Adjustment

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**** End of Certificate****

Certificate of Calibration

Certificate No.: WK2402-300-865

Page 1 of 2

Customer : OKLA TESTING & CONSULTING SERVICE CO., LTD.
67/35-36, 3rd Floor, Petchkasem 7/1, Petchkasem Rd.,
Wattthapra, Bangkok Yai, Bangkok 10600 Thailand.

| | |
|---------------------------------------|--|
| Instrument : Dissolved Oxygen | Ambient Temperature : (25.0 ± 2) °C |
| Manufacturer : HANNA | Humidity : (50.0 ± 15) %RH |
| Model : HI5421 | Received Date : 27-Feb-24 |
| Serial No. : 04240005101 | Calibrated Date : 27-Feb-24 |
| Identity No. : KC1A11T8H | Issued Date : 27-Feb-24 |
| Range : See to data | Calibrated Location : In Lab |
| Resolution : See to data | |
| Calibration Method : CP-WK-C03 | |

Reference standard instruments :

| Instrument | Serial No. | Certificate No. | Due Date | Traceability to |
|----------------------|------------|-----------------|-----------|-----------------------|
| Zero Oxygen Solution | HI7040L | S0115/20 | 30-Aug-25 | NIST |
| DO Meter | 874477 | WK2305-300-241 | 25-May-24 | WK Electric Co., Ltd. |
| Digital Thermometer | WK-CT-025 | WK2402-300-25 | 25-Feb-25 | WK Electric Co., Ltd. |

NIST : National Institute of Standard and Technology.

This result calibrate was found accurate as shown on date place of calibrate only
This certificate is traceability to th International System of Unit (SI)

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

Calibrated by : Mr. Usa Phuangphiphat

Approved by :

Authorized Signatory

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Certificate No. : MT24-5501

Page : 2 of 2

Result : Without adjustment

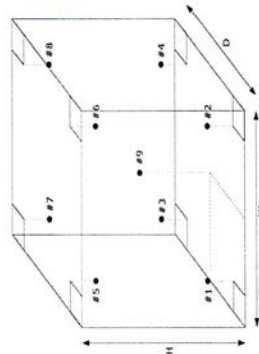
Resolution : 0.1 °C

Function : Temperature measurement

Calibration point : 104, 140, 160, 180 °C

| Calibration point (°C) | Temperature of UUC* at each position (°C) | | | | | | | | | Uncertainty of measurement (+/- °C) |
|------------------------|---|---------|---------|---------|---------|---------|---------|---------|---------|-------------------------------------|
| | Ch.1 | Ch.2 | Ch.3 | Ch.4 | Ch.5 | Ch.6 | Ch.7 | Ch.8 | Ch.9 | |
| 104 | 104.456 | 104.237 | 105.035 | 104.871 | 104.694 | 105.043 | 104.255 | 104.486 | 104.956 | 0.67 |
| 140 | 141.286 | 140.733 | 141.403 | 141.502 | 140.674 | 141.611 | 139.677 | 141.949 | 141.131 | 0.87 |
| 160 | 161.706 | 160.284 | 161.505 | 161.802 | 160.657 | 161.912 | 159.449 | 161.991 | 161.106 | 0.91 |
| 180 | 181.164 | 179.786 | 180.990 | 181.272 | 180.128 | 181.374 | 178.909 | 181.619 | 180.617 | 0.90 |

| Setting temperature (°C) | Indicating Temperature (°C) | Measured stability (+/- °C) | Measured uniformity (°C) | Overall variation (°C) |
|--------------------------|-----------------------------|-----------------------------|--------------------------|------------------------|
| 104.0 | 104.1 to 104.3 | 0.53 | 1.0 | 1.6 |
| 140.0 | 140.1 to 140.3 | 0.61 | 2.1 | 3.1 |
| 160.0 | 160.1 to 160.3 | 0.65 | 2.1 | 3.6 |
| 180.0 | 180.1 to 180.3 | 0.64 | 2.2 | 3.6 |



Front view

UUC* = Unit under calibration
Uniformity = Maximum and Minimum difference of measured temperature at any probes and the measured temperature at the reference and same time.
Overall Variation = Difference of temperature value between the maximum and minimum any time.
Stability = One half of the maximum difference of measured temperatures at any one probe.

Certificate of Calibration

Certificate No. : MT24-5501

Page : 1 of 2

Customer : บริษัท โกลา เทคโนโลยี แอนด์คอนโซลิ่ง เซอร์วิส จำกัด
Address : 67/35-36 ชั้น 3 ซอยเพชรเกษม 7/1 แขวงวัดท่าพระ เขตบางกอกใหญ่ กรุงเทพมหานคร 10600

Description : Drying Oven
Manufacturer : N/A
Model : SOV70B
Serial No. : KWF2021021902
Identification No. : OKLA-LAB-013/170621
Calibration Place : Laboratory

Order No. : 2026/24
Received date : Jun 24, 2024
Calibration date : Jun 24, 2024
Environment Condition :
Temperature : (25±10) °C
Humidity : (50±30) %RH

Calibration Method : Calibration were conducted using In-house calibration procedure CP-MT-006 According to comparison with LXI Data Acquisition Switch Unit with sensor. The calibration methods based on Euramet Calibration Guide No.20 - guidelines on the Calibration of Temperature and/or Humidity Controlled Enclosures.

Reference Standard Instruments :

| Instrument | Model | Serial No. | Certificate No. | Due Date |
|--|--------|------------|-----------------|--------------|
| LXI Data Acquisition Switch Unit with Sensor | 34972A | MY57003222 | MT23-5938 | Oct 05, 2024 |

The effect that the result relate only to the items calibrated. It was found accurate as shown on date and place of calibration only.

Traceability : This measurement are traceable to the International System of Unit (SI), through National Institute of Metrology Thailand (NIMT)



The reported expanded uncertainty of measurement was based on standard uncertainty multiplied by coverage factor k = 2, providing a level of confidence of not less than 95%

Calibrated by :
Approved by :
Issue date : Jun 28, 2024

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Certificate of Calibration

Certificate No. : 67-400117-1

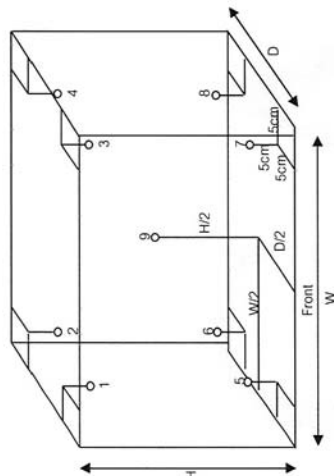
Page : 2 of 2

Result of Calibration : Without Adjustment

UUC Condition As-Received : Good

Function : Temperature measurement

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



| Test Point (°C) | Setting Temperature (°C) | Indicating Temperature (°C) | Measured Temperature (°C) @ Sensor No. | | | | | | | | | Uncertainty (± °C) |
|--------------------|-----------------------------|--------------------------------|--|-------|-------|-------|-------|-------|-------|-------|-------|-----------------------|
| | | | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | |
| 20.0 | 20.0 | 20.0 | 20.46 | 20.25 | 19.60 | 19.58 | 19.84 | 19.64 | 19.45 | 19.59 | 20.01 | 0.34 |

| Test Point (°C) | Setting Temperature (°C) | Indicating Temperature (°C) | Measured Uniformity (°C) | Measured Stability (°C) | Overall Variation (°C) |
|--------------------|-----------------------------|--------------------------------|-----------------------------|----------------------------|---------------------------|
| | | | | | |
| 20.0 | 20.0 | 20.0 | 0.589 | 0.073 | 1.129 |

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%

- o o -

Certificate of Calibration

Certificate No. : 67-400117-1

Page : 1 of 2

Submitted by : Okla Testing & Consulting Service Co., Ltd.

67/35-36, 3rd Floor, Petchkasem 7/1, Petchkasem Rd.,

Wathapra, Bangkok Yai, Bangkok 10600 Thailand

Equipment : Temperature controlled enclosure (Incubator)

Manufacturer : S-Cool

Model : SM 61 M

Range : N/A °C

Resolution : 0.1 °C

Serial No. : 18021147

ID No. : OKLA-LAB-011/190

Environment : On site calibration was carried out at the Laboratory.

Okla Testing & Consulting Service Co., Ltd.

Ambient Temperature : (32.0 to 33.0) °C

Relative Humidity : (50 to 55) %

Line Voltage : (221.0 to 223.0) V

Date of Received : 26 February 2024

Date of Calibration : 26 February 2024

Date of Issue : 29 February 2024

Calibrated by : Kittisak Kokaeo

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 RTD Probe

ID No. Cert. No. Due Date

400046 & 400047 67-400047-2 26 Jul 2024

Traceability

National Institute of Metrology Thailand (NIMT)

Approved by : [REDACTED]

Laboratory Manager

The Uncertainties are for a confidence probability of approximately 95%

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Certificate No. : J048-TC24021201

Page : 2 of 3

Calibration Report

Equipment : Refrigerator
Model : SPB-0500
Environment : Ambient Temperature (24.3 to 24.9) °C
Relative Humidity (45.3 to 51.9) %
Line Voltage (226 to 228) V_{ac}
Manufacturer : SANDEN
Serial No : SPB0500-231007454

Detail of this calibration result.:

- This instrument was calibrated by insert 9 standards Resistance Thermometer Detector, in to the chamber, under no load condition in according to TLAS G-20-1/02-08 (E).
- The temperature scale used was based on ITS-90.
- Reference standards instrument :

| Instrument | Model | Serial No./ID No. | Certificate No. | Due Date |
|---------------------------------|---------|-------------------|-----------------|------------------|
| Data Acquisition Switch unit | 34972A | MY49010832 | QR23-2679 | 15 November 2024 |
| Resistance Thermometer Detector | 100 ohm | RTD505(01 to 10) | QR23-2679 | 15 November 2024 |

- This certificate was certified only for the instrument we calibrated.
- The measured values in this report refer to the time of examination.
- This certificate is traceable to SI Unit through Quality Reborn Co.,Ltd.

NSC - ONSC accredited no. Calibration 0292

7. Condition of calibrated item : Good

UUC Description :

Operation time 5 Hour 00 Minute Calibration point 2.0, 4.0, 6.0 °C

The air ventilation of the instrument was set at position.

Fresh Air Damper

| | | | | | | | | | |
|-------------------------------------|-------|--------------------------|----------|--------------------------|-----|--------------------------|--------|--------------------------|-----|
| <input type="checkbox"/> | Open | <input type="checkbox"/> | Position | <input type="checkbox"/> | Min | <input type="checkbox"/> | Medium | <input type="checkbox"/> | Max |
| <input type="checkbox"/> | Close | | | | | | | | |
| <input checked="" type="checkbox"/> | X | | | | | | | | |

8 Result of calibration :

(X) Without adjustment () After adjustment



Megafil Co., Ltd.

MG-FM-7.8-002, R00 (01/07/19)

Certificate No. : J048-TC24021201

Page : 1 of 3

Certificate of Calibration

Customer : Okla Testing & Consulting Service Co., Ltd.
Address : 67/35-36, 3rd Floor, Phetkasem 7/1 Rd.,
Wathapra, Bangkokkayai, BKK. 10600

Equipment : Refrigerator
Manufacturer : SANDEN
Model : SPB-0500
Serial No. : SPB0500-231007454
ID No. : -
Resolution : 0.1 °C
Location of Calibration : Central Laboratory FL.3
Reference Job No. : JB24048
Received Request Date : 12 February 2024
Calibrated by : Pawut Wongnarakornkul
Date of Calibration : 12 February 2024

Approved by :



Date of Issue : 13 February 2024

The uncertainties are for a confidence probability of approximately 95%

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Megafil Co.,Ltd.

MG-FM-7.8-001, R00 (01/07/19)



Certificate of Calibration

Certificate No. : 67-400117-4

Page : 1 of 2

Submitted by :

Okla Testing & Consulting Service Co., Ltd.

67/35-36, 3rd Floor, Petchkasem 7/1, Petchkasem Rd.,
Watthapra, Bangkok Yai, Bangkok 10600 Thailand

Equipment :

Water Bath

Manufacturer : LabTech

Model : LWB-222A

Range : N/A °C

Resolution : 0.01 °C

Serial No. : BCCLJ23001C

ID No. : OKLA-LAB-008/122011

Environment :

On site calibration was carried out at the Laboratory,

Okla Testing & Consulting Service Co., Ltd.

Ambient Temperature : (32.0 to 33.0) °C

Relative Humidity : (50 to 55) %

Line Voltage : (221.0 to 223.0) V

Date of Received : 26 February 2024

Date of Calibration : 26 February 2024

Date of Issue : 29 February 2024

Calibrated by : Permpoon Chanpu

Calibration Method :

This instrument was calibrated by In-house method CAL-M4006 based on ASTM E715-80

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 RTD probe

ID No. Cert. No. Due Date

Traceability

400029 & 400043 66-400593-1

National Institute of Metrology Thailand (NIMT)

Approved by :

Laboratory Manager

The Uncertainties are for a confidence probability of approximately 95%

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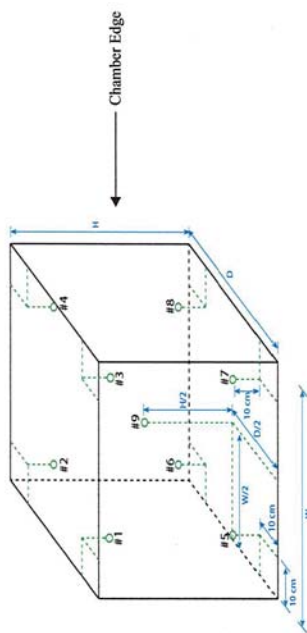


Certificate No. : J048-TC24021201

Page : 3 of 3

Result of Calibration

Sensor installation at nine locations as show in figure.

Chamber capacity (W x H x D) : (0.55 x 1.61 x 0.42) m : 0.37 m³

| Position | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 |
|------------------|----------|----------|----------|----------|----------|----------|----------|----------|----------|
| Ref. Std/ID No.: | RTD50501 | RTD50502 | RTD50503 | RTD50504 | RTD50505 | RTD50506 | RTD50507 | RTD50508 | RTD50509 |

Temperature distribution

| Cal. Point (°C) | Setting Temperature (°C) | Indicating Temperature (°C) | Measured Temperature (°C) @ Sensor No. (Sensor No.9 is REF) | | | | | | | | | Uncertainty (± °C) |
|--------------------|-----------------------------|--------------------------------|--|------|------|------|------|------|------|------|------|-----------------------|
| | | | t, °C | | | | | | | | | |
| | | | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | |
| 2.0 | 2.0 | 2.0 | 2.03 | 1.26 | 1.94 | 1.31 | 3.06 | 2.95 | 2.21 | 2.15 | 2.17 | 0.44 |
| 4.0 | 4.0 | 4.0 | 3.96 | 3.22 | 3.84 | 3.31 | 5.05 | 4.91 | 4.19 | 4.18 | 4.14 | 0.44 |
| 6.0 | 6.0 | 6.0 | 5.85 | 5.16 | 5.88 | 5.32 | 7.07 | 6.91 | 6.18 | 6.24 | 6.10 | 0.44 |

Chamber performance

| Cal. Point (°C) | Setting Temperature (°C) | Indicating Temperature (°C) | | Measured Uniformity (°C) | Measured Stability (± °C) | Overall Variation (°C) |
|-----------------|--------------------------|-----------------------------|---------|--------------------------|---------------------------|------------------------|
| | | Min | Average | | | |
| 2.0 | 2.0 | 2.0 | 2.0 | 1.07 | 0.19 | 2.06 |
| 4.0 | 4.0 | 4.0 | 4.0 | 1.09 | 0.22 | 2.04 |
| 6.0 | 6.0 | 6.0 | 6.0 | 0.98 | 0.24 | 2.18 |

Note: The quoted uncertainty include Stability and 20% of Uniformity.

Stability = One-half of the greatest maximum difference of measured temperatures at any one sensor.

Uniformity = The maximum difference of measured temperatures at any sensors and 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.

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%.

- End of Certificate -

Megafil Co., Ltd.

MG-FM-7.8-002, R00 (01/07/19)



Certificate of Calibration

Certificate No. : 67-200069-1 Page : 1 of 2

Submitted by :

Okla Testing&Consulting Service Co.,Ltd.

67/35-36, 3rd Floor, Petchkasem 7/1, Petchkasem Rd.,

Wathapra, Bangkok Yai, Bangkok 10600 Thailand

Equipment :

Electronic Balance

Manufacturer : Sartorius

Model : BSA224S-CW

Serial No. : 35790699

Capacity : 200 g Resolution : 0.0001 g

On site calibration was carried out at tl Laboratory Environmental,Okla

Testing&Consulting Service Co.,Ltd.

Ambient Temperature : (28.4 to 28.5) °C

Relative Humidity : (49.4 to 51.1) %

Air Pressure : 1012.0 mbar

Date of Received :

26 February 2024

Date of Calibration :

26 February 2024

Date of Issue :

27 February 2024

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.

Traceability

E261-E2624

Due Date

08 Nov 2024 National Institute of Metrology (Thailand), (NIMT)

Approved by :

Laboratory Manager

The Uncertainties are for a confidence probability of approximately 95%

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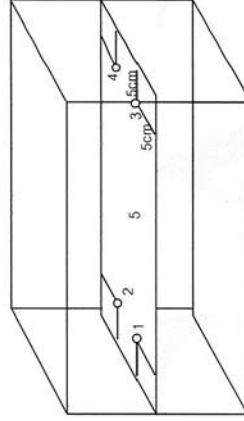
Certificate of Calibration

Certificate No. : 67-400117-4 Page : 2 of 2

Result of Calibration : Without Adjustment

UUC Condition As-Received : Good

Function : Temperature measurement



Front

| Test Point (°C) | Setting Temperature (°C) | Indicating Temperature (°C) | Measured Temperature (°C) @ Sensor No. | | | | | Uncertainty (± °C) | Measured Uniformity (°C) | Measured Stability (°C) |
|--------------------|-----------------------------|--------------------------------|--|-------|-------|-------|-------|-----------------------|-----------------------------|----------------------------|
| | | | 1 | 2 | 3 | 4 | 5 | | | |
| 60 | As Mark 60 | - | 60.02 | 59.97 | 60.02 | 59.95 | 60.05 | 0.53 | 0.69 | 0.40 |

$$\sqrt{0.53^2 + 0.69^2} = 0.88$$

Remark The uncertainty is not combine uniformity of the water bath

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%

-o0o-

CERTIFICATE OF CALIBRATION

Certificate No. : CDT-116-67

MEASUREMENT ITEM
MANUFACTURER : EUTECH
MODEL/TYPE : ECO SCAN TEMPS
SERIAL NUMBER : 816366
ID NUMBER : -
CONDITION AS-RECEIVED
CUSTOMER : OKLA Testing and Consulting Service Co., Ltd.
67/35-36 Floor 3, Soi Petchakaset 7/1,
Petchakaset Rd, Watthapra, Bangkok 10600.

RECEIVED DATE : 01 Jul 2024
MEASUREMENT DATE : 03 Jul 2024
ISSUE DATE : 04 Jul 2024

ENVIRONMENTAL CONDITIONS:
Ambient condition in the laboratory are as follow:
Temperature : 23.0 ± 3.0 °C
Relative Humidity : 55.0 ± 15.0 %RH

NOTED: The certificate is valid only to the item calibrated on date and place of calibration.

TABULATION OF RESULTS:

The table on next page give the measured values.



Calibrated by:

Approved signatory:

Calibration Department Manager

Page 1 of 2 Pages

Calibration procedure:
The temperature calibration was done by In-House calibration method as WI-CL-001 according to comparison method with standard digital temperature indicator and standard temperature probe. The temperature scale use was based on ITS-90.

Traceability:
The measurement results are traceable to the international system of units (SI) through National Institute of Metrology Thailand (NIMT).
Certificate number: TT-0047-24, Certificate number: ER-0101-23

Reference Used During Calibration:

1. Standard Temperature Probe
Model: STS-100 A500, Serial No.: 667682-09,
Due date: 26 Mar 2025
2. Digital Temperature Indicator
Model: DTI-1000-A MKII, Serial No.: 671407-00591 Due date: 14 Sep 2024

Uncertainty of Measurement:

The reported uncertainty of measurement is based on the standard uncertainty multiplied by a coverage factor $k=2$, which for a normal distribution corresponds to a coverage probability of approximately 95%. The standard uncertainty has been determined in accordance with the GUM 'Evaluation of measurement data - Guide to the expression of uncertainty in measurement'.

Certificate of Calibration

Certificate No. : 67-200069-1

Result of Calibration : Without Adjustment

UUC Condition As-Received : Good

Departure of indication from nominal value

| Nominal Value (g) | Correction (g) | Uncertainty \pm (g) |
|----------------------|-------------------|--------------------------|
| 0.01 | 0.0000 | 0.00011 |
| 0.05 | 0.0000 | 0.00011 |
| 0.1 | 0.0000 | 0.00011 |
| 0.2 | 0.0000 | 0.00011 |
| 0.5 | 0.0000 | 0.00011 |
| 1 | 0.0000 | 0.00011 |
| 10 | 0.0000 | 0.00011 |
| 50 | 0.0000 | 0.00014 |
| 100 | 0.0000 | 0.00020 |
| 150 | 0.0001 | 0.00038 |
| 200 | 0.0002 | 0.00038 |

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%

Eccentric error

Load test : 50 g

| | | | | |
|---------|--------|--------|--------|--------|
| A | B | C | D | E |
| -0.0001 | 0.0001 | 0.0001 | 0.0000 | 0.0000 |

g



Repeatability

Load test : 200 g

Sidev. : 0.00000 g

-o0o-

CERTIFICATE OF CALIBRATION

Certificate No. : CRT-061-67

Page 1 of 2 Pages

MEASUREMENT ITEM
MANUFACTURER
MODEL/TYPE
SERIAL NUMBER
ID NUMBER
CONDITION AS-RECEIVED
CUSTOMER

: Digital Thermo Hygrometer
: KEPLER Instrument
: KTH-02
: 234011889

: -
: Used Item
: Olda Testing and consulting services Co., Ltd.
67/35-36, 3rd Fl, Petchkasem soi 7/1, Wat Thapra,
Bangkokkyl, Bangkok, Thailand 10600.

RECEIVED DATE
MEASUREMENT DATE
ISSUE DATE

: 16 Dec 2024
: 19 Dec 2024
: 19 Dec 2024

ENVIRONMENTAL CONDITIONS:

Ambient condition in the laboratory are as follow:

Temperature : 23.0 ± 3.0 °C
Relative Humidity : 55.0 ± 15.0 %RH

NOTED: The certificate is valid only to the item calibrated on date and place of calibration.

TABULATION OF RESULTS:

The table on next page give the measured values.

Calibrated by:

Approved signatory:



Calibration Department Manager



Result of Calibration: ☒ Without Adjustment ☐ With Adjustment

Calibration Range: 20 °C to 30 °C

Function:

Table 3: This equipment was connected with Thermocouple sensor type K.
Dimension: Diameter 3 mm. Length 116 mm.

| Immersion Depth (mm) | Standard Reading (°C) | UUC Reading (°C) | Error (°C) | Uncertainty (°C) |
|-------------------------|--------------------------|---------------------|---------------|---------------------|
| 110 | 20.047 | 20.1 | 0.0 | 0.26 |
| 110 | 25.043 | 25.0 | 0.0 | 0.26 |
| 110 | 30.034 | 30.0 | 0.0 | 0.26 |

UUC*: Unit Under Calibration

End of Certificate of Calibration



Continuation of Certificate of Calibration Number: CRT-061-67

Measurement Results:

The results of calibration and associated measurement uncertainties are reported in the table below.

Result of Calibration: ☒ Without Adjustment ☐ With Adjustment

Table 1: The results of calibration of air temperature are reported in table below.

Calibration Range: 20 °C to 30 °C

| Determined (°C) | Standard Reading (°C) | UUC Reading (°C) | Error (°C) | Uncertainty ±(°C) |
|--------------------|--------------------------|---------------------|---------------|----------------------|
| 20.00 | 20.06 | 20.6 | 0.5 | 0.31 |
| 25.00 | 25.04 | 25.3 | 0.3 | 0.31 |
| 30.00 | 30.04 | 29.6 | -0.4 | 0.31 |

Table 2: The results of calibration of relative humidity at 23 °C are reported in table below.
Calibration Range: 35%RH to 70%RH

| Air Temperature (°C) | Standard Reading (%RH) | UUC Reading (%RH) | Error (%RH) | Uncertainty ±(%RH) |
|-------------------------|---------------------------|----------------------|----------------|-----------------------|
| 23.04 | 34.74 | 36 | 1 | 1.0 |
| 23.04 | 44.71 | 43 | -2 | 1.3 |
| 23.00 | 59.68 | 58 | -2 | 1.8 |
| 23.03 | 69.61 | 66 | -4 | 1.8 |

UUC*: Unit Under Calibration

End of Certificate of Calibration

