

ภาคผนวก 11

เอกสารสอบเทียบเครื่องมือที่ใช้ในการวิเคราะห์



บริษัท ไทยยูนิค จำกัด

THAI UNIQUE CO., LTD.

80-82 ถนนประชาธิปไตย แขวงบางขุนพรหม เขตพระนคร กรุงเทพฯ 10200

80-82 Prachathipatai Rd., Bangkhunphrom, Pranakorn, Bangkok 10200

Tel. 0-2629-0191-6, 0-2280-1787, Fax. 0-2280-1788, E-mail : thawatt@thaiunique.com, Website : www.thaiunique.com

ATOMIC ABSORPTION SPECTROMETER TEST CERTIFICATE

Certificate No : SV2312/21428

Instrument Type : ATOMIC ABSORPTION SPECTROMETER

Model : AA 240

Serial Number : AA0909M072

Organization : S.P.J. Scientific Co., Ltd.

Address : 80 Soi Nakkeera Lamthong 3, Sapansoong, Sapansoong, Bangkok 10250

Date : 20 Dec 2023

Hollow cathode lamps used

Element	Lamp number	Comments
Arsenic	56-101003-00	
Copper	56-101014-00	
Potassium	56-101042-00	
Gold	56-101021-00	

Test description	Specification	Result	Comments
Light throughput (% Gain) or (EHT)			
Cu at 324.8 nm	$\leq 64 \%$ or 380 V	42 %	Pass
As at 193.7 nm	$\leq 80 \%$ or 540 V	68 %	Pass
K at 766.5 nm*	$\leq 84 \%$ or 540 V	56 %	Pass
Other.....			
Photometric noise Cu BGC off			
STDV @ 0	≤ 0.0005	0.0000	Pass



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Tel. 0-2629-0191-6, 0-2280-1787, Fax. 0-2280-1788, E-mail : thawatt@thaiunique.com, Website : www.thaiunique.com

Wavelength accuracy			
Cu at 324.8 nm	323.0 nm – 326.0 nm	324.7 nm	Pass
As 193.7 nm	192.0 nm – 195.0 nm	193.6 nm	Pass
K at 766.5 nm*	765.0 nm – 768.0 nm	766.6 nm	Pass
Other.....			
High solids nebulizer setting**			
Uptake rate	7.2 – 10.6 ml / min	9.0 ml/min	Pass
Max Abs	≥ 0.75 Abs	0.77 Abs	Pass
Precision(%RSD)	≤ 0.5 %	0.3 %	Pass
Zeeman Background Correction Accuracy (%)***			
BCA @ Au 242.8 nm	< 3.7 %	***	***
Zeeman Magnetic Sensitivity Ratio (%)***			
MSR @ Cu 324.7 nm	> 70 %	***	***
Characteristic mass and sensitivity ****			
Sensitivity	≥ 0.21 Abs	****	****
Precision (%RSD)	≤ 4.0 %	****	****

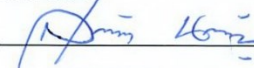
* for Wideband PMT (Wavelength 190nm – 900nm)

** for Flame system

*** for Zeeman system

**** for Graphite furnace system

CALIBRATED BY :

Signature: 

Engineer : Suriya Nacharoen

Date : 20 / Dec / 2023



APPROVED BY :

Signature: 

Service Manager Suchai Sanguanklattichai

Date : 20 / Dec / 2023

CAL

Calibratech Co.,Ltd.

7/106-7 Moo 2, Sukhprachasan 3 Rd., Bangpood, Pakkred, Nonthaburi 11120

Tel.(02) 964-6211 Fax.(02) 964-5155, e-mail : calibratech.cal@yahoo.com, calibratech.cal@hotmail.com



NSC-TISI-TIS 17025
CALIBRATION 0030

Certificate of Calibration

Certificate No. : 67-200227-2

Page : 1 of 2

Submitted by : S.P.J. Scientific Co., Ltd.

80 Soi Nakkilalaemthong 3, Thapchang, Saphansung, Bangkok 10250

Equipment : Electronic Balance

Manufacturer : METTLER TOLEDO Model : AL204

Serial No. : 1228320221 ID No. : SPJ-TE-012

Capacity : 210 g Resolution : 0.0001 g

Environment : On site calibration was carried out at the Balance Room, S.P.J. Scientific Co., Ltd.

Ambient Temperature : (21.5 to 21.8) °C

Relative Humidity : (33.3 to 38.7) %

Air Pressure : 1005.0 mbar

Date of Received : 20 June 2024

Date of Calibration : 20 June 2024

Date of Issue : 26 June 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.	Cert. No.	Due Date	Traceability
E261-E2624	C02232088	08 Nov 2024	National Institute of Metrology (Thailand), (NIMT)

Approved by :

(Surachai Promthong)

Laboratory Manager

The Uncertainties are for a confidence probability of approximately 95%

This certificate may not be reproduced other than in full except with the prior written approval of the Calibratech Co.,Ltd.



CAL

Calibratech Co.,Ltd.

7/106-7 Moo 2, Sukhprachasan 3 Rd., Bangpood, Pakkred, Nonthaburi 11120

Tel.(02) 964-6211 Fax.(02) 964-5155, e-mail : calibratech.cal@yahoo.com, calibratech.cal@hotmail.com

Certificate of Calibration

Certificate No. : 67-200227-2

Page : 2 of 2

Result of Calibration : Without Adjustment

UUC Condition As-Received : Good

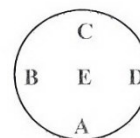
Departure of indication from nominal value

Nominal Value (g)	Correction (g)	Uncertainty \pm (g)
0.001	0.0000	0.00012
0.01	0.0000	0.00012
0.1	0.0000	0.00012
1	-0.0001	0.00013
5	-0.0001	0.00013
10	-0.0001	0.00013
50	-0.0002	0.00015
100	-0.0002	0.00020
150	-0.0002	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 $k = 2.06$, providing a level of confidence of approximately 95%

Eccentric error Load test : 50 g
A B C D E
0.0003 0.0001 -0.0001 -0.0001 0.0000 g



Repeatability Load test : 200 g
Stdev. : 0.00005 g

- o0o -





SCIMET Co., Ltd.

1194 Soi Wachirathamsathit 57, Bangchak,
Phrakhanong, Bangkok 10260 Thailand
Email:scimet2022@gmail.com, Tel: 02 460 9239
https://www.scimet.co.th



Certificate No. C12240252

Calibration Certificate

Equipment:	Balance	Job No.:	KSMT2400867
Model:	ME240T/00	Received Date:	02 May 2024
Serial No.(or ID):	B950781446 (SPJ-TE-039)	Issued Date:	02 May 2024
Manufacturer:	Mettler Toledo	Page:	1 of 2
Condition:	In condition		

Customer

S.P.J. SCIENTIFIC COMPANY LIMITED
80 Soi Nakkilalaemthong 3, Thab Chang, Saphansoong, Bangkok 10250

Calibration Place

S.P.J. SCIENTIFIC COMPANY LIMITED (Balance Room)
80 Soi Nakkilalaemthong 3, Thab Chang, Saphansoong, Bangkok 10250

Calibration Date

02 May 2024

Environment Condition

Temperature: 22.9 °C ± 0.8 °C
Humidity: 47.3 %RH ± 1.6 %RH

The Method used

In-house method, WI12, based on UKAS Lab 14

Traceability

This certificate is traceable to the SI Units maintained by National Institute of Metrology (NIMT), Thailand through SPC RT CO., Ltd. Certificate No. C02221859 and SCIMET Co., Ltd. Certificate No. C13240012

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 SCIMET Co., Ltd.

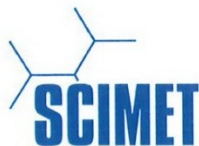
(Mr. Chanachol Moohammudrosol)

Person in charge



(Mr. Thalerngkeat Pongngam)

Authorized signatory



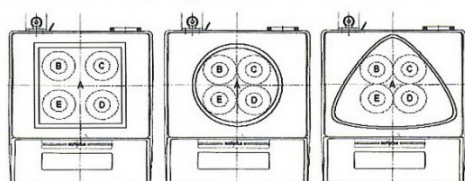
Certificate No.: C12240252

Page: 2 of 2

Calibration Results:

Without Adjustment (Use Internal calibration 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		100	(g)
Reference Points (g)						
A	B	C	D	E		
-	-0.0002	0.0000	0.0000	-0.0001		

Repeatability: Determination of the standard deviation of weighing balance., Readability 0.0001 (g)

Nominal test value (g)	Standard Deviation
20	0.00004
200	0.00006

Error of indication from nominal or conventional mass value., Readability 0.0001 (g)

Nominal Value (g)	Conventional Mass (g)	Displayed Value (g)	Error of indication (g)	Uncertainty (g)	k
0	0.00000	0.0000	0.0000	0.00011	2.04
0.1	0.10000	0.1000	0.0000	0.00011	2.04
0.5	0.49998	0.5000	0.0000	0.00011	2.04
1	1.00000	1.0000	0.0000	0.00011	2.04
2	2.00000	2.0000	0.0000	0.00011	2.04
5	5.00000	5.0000	0.0000	0.00011	2.04
10	10.00004	10.0000	0.0000	0.00011	2.04
20	19.99996	20.0000	0.0000	0.00012	2.03
50	49.99995	49.9999	0.0000	0.00013	2.02
100	99.99992	100.0000	0.0000	0.00017	2.01
120	119.99988	119.9999	0.0000	0.00021	2.00
150	149.99987	149.9998	-0.0001	0.00024	2.00
200	199.99996	199.9999	-0.0001	0.00030	2.00

The End of Certificate

บริษัท ชายนันท์ จำกัด (SCIMET CO., LTD.)

1194 Soi Wachirathamsathit 57, Bangchak, Phrakhanong, Bangkok 10260 Thailand
Email: scimet2022@gmail.com, Tel: 02 460 9239

FC12-02: 30 MAY 2023



Refer to Certificate No.: C12240252

Page: 1 of 2

Statements of conformity:

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

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

Tolerance and Decision rules:

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

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



(Mr. Thalerngkeat Pongngam)

Authorized signatory

บริษัท ชายนันเมท จำกัด (SCIMET CO., LTD.)

1194 Soi Wachirathamsathit 57, Bangchak, Phrakhanong, Bangkok 10260 Thailand
Email: scimet2022@gmail.com, Tel: 02 460 9239

FC12-02: 30 MAY 2023



Refer to Certificate No.: C12240252

Page: 2 of 2

Statements of conformity:

Without Adjustment (Use Internal calibration adjustment)

Readability; 0.0001 g

Tolerances : 0.0005 g

Nominal Value g	Error of indication g	Guard band (w) g	Tolerance (\pm) g	Conformity
0	0.0000	0.00011	0.0005	Pass
0.1	0.0000	0.00011	0.0005	Pass
0.5	0.0000	0.00011	0.0005	Pass
1	0.0000	0.00011	0.0005	Pass
2	0.0000	0.00011	0.0005	Pass
5	0.0000	0.00011	0.0005	Pass
10	0.0000	0.00011	0.0005	Pass
20	0.0000	0.00012	0.0005	Pass
50	0.0000	0.00013	0.0005	Pass
100	0.0000	0.00017	0.0005	Pass
120	0.0000	0.00021	0.0005	Pass
150	-0.0001	0.00024	0.0005	Pass
200	-0.0001	0.00030	0.0005	Pass

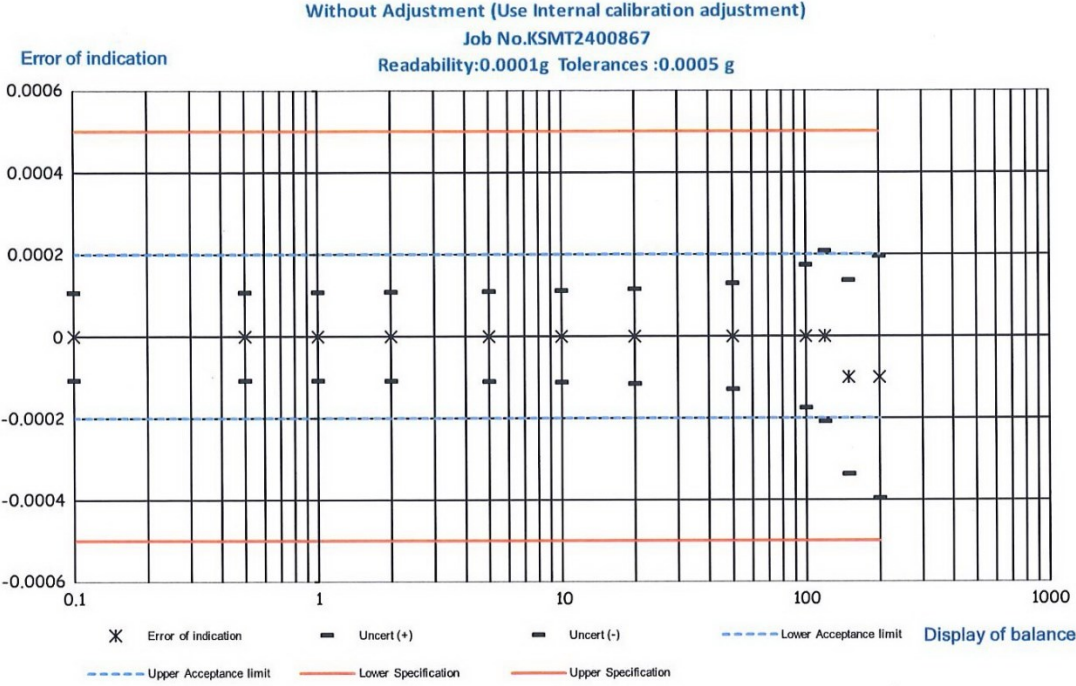
The validity of the statements of conformity cannot be guaranteed for different places of use, environmental conditions or improper use.

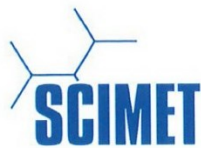
The End of Statements of conformity

บริษัท ชายนีเมท จำกัด (SCIMET CO., LTD.)

1194 Soi Wachirathamsathit 57, Bangchak, Phrakhanong, Bangkok 10260 Thailand
Email: scimet2022@gmail.com, Tel: 02 460 9239

FC12-02: 30 MAY 2023





ใบตรวจสอบสภาพเครื่องชั่ง

เลขที่ใบงาน: KSMT2400867

ชนิดเครื่องมือ: Balance

รุ่น: ME240T/00

หมายเลขเครื่อง: B950781446

ตรวจสอบ (รับ)		รายการตรวจเช็ค	ตรวจสอบ (ส่ง)		หมายเหตุ
02 May 2024			02 May 2024		
ปกติ	ไม่ปกติ		ปกติ	ไม่ปกติ	
		General			
<input checked="" type="checkbox"/>	<input type="checkbox"/>	1. สายไฟ/Adapter, power supply 220/110V	<input checked="" type="checkbox"/>	<input type="checkbox"/>	
<input checked="" type="checkbox"/>	<input type="checkbox"/>	2. ความสมบูรณ์ชุดกระจกกันลม (Cover)	<input checked="" type="checkbox"/>	<input type="checkbox"/>	
<input type="checkbox"/>	<input checked="" type="checkbox"/>	3. ความสมบูรณ์ชุดของระดับน้ำ	<input type="checkbox"/>	<input checked="" type="checkbox"/>	*
<input checked="" type="checkbox"/>	<input type="checkbox"/>	4. การปรับระดับของขาตั้งเครื่อง	<input checked="" type="checkbox"/>	<input type="checkbox"/>	
<input checked="" type="checkbox"/>	<input type="checkbox"/>	5. การตอบสนองของปุ่มกด	<input checked="" type="checkbox"/>	<input type="checkbox"/>	
<input checked="" type="checkbox"/>	<input type="checkbox"/>	6. ความสมบูรณ์ของ Display	<input checked="" type="checkbox"/>	<input type="checkbox"/>	
<input checked="" type="checkbox"/>	<input type="checkbox"/>	7. การแสดงผลของ Display หลังวางน้ำหนัก	<input checked="" type="checkbox"/>	<input type="checkbox"/>	
<input checked="" type="checkbox"/>	<input type="checkbox"/>	8. ชุดรองจานชั่ง (Stopper) / pan support	<input checked="" type="checkbox"/>	<input type="checkbox"/>	
<input checked="" type="checkbox"/>	<input type="checkbox"/>	9. การทำงานของ Function Internal / External	<input checked="" type="checkbox"/>	<input type="checkbox"/>	
<input checked="" type="checkbox"/>	<input type="checkbox"/>	10. ความสะอาดของตัวเครื่องภายนอกและแกน load cell	<input checked="" type="checkbox"/>	<input type="checkbox"/>	
<input checked="" type="checkbox"/>	<input type="checkbox"/>	11. สภาวะแวดล้อม ณ สถานที่ตั้งเครื่อง	<input checked="" type="checkbox"/>	<input type="checkbox"/>	

หมายเหตุเพิ่มเติม/ข้อแนะนำ :

* ลูกน้ำเริ่มเสื่อมสภาพ ตั้งไม่เข้าศูนย์แต่ยังอยู่ในวงศูนย์กลาง

ยังสามารถใช้งานได้ปกติ

Mr. Chanachol Moohammudrosol

Service Engineer

บริษัท ชายนันเมท จำกัด (SCIMET CO., LTD.)

1194 Soi Wachirathamsathit 57, Bangchak, Phrakhanong, Bangkok 10260 Thailand
Email: scimet2022@gmail.com, Tel: 02 460 9239

F112-00: 08 MAR 2023

CAL

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7/106-7 Moo 2, Sukhprachasan 3 Rd., Bangpood, Pakkred, Nonthaburi 11120

Tel.(02) 964-6211 Fax.(02) 964-5155, e-mail : calibratech.cal@yahoo.com, calibratech.cal@hotmail.com



NSC-TISI-TIS 17025
CALIBRATION 0030

Certificate of Calibration

Certificate No. : 67-200227-1

Page : 1 of 2

Submitted by : S.P.J. Scientific Co., Ltd.

80 Soi Nakkilalaemthong 3, Thapchang, Saphansung, Bangkok 10250

Equipment : Electronic Balance

Manufacturer : METTLER TOLEDO Model : MS105DU

Serial No. : B216861078 ID No. : SPJ-TE-013

Capacity : 120 g Resolution : 0.00001g/42g, 0.0001g/120g

Environment : On site calibration was carried out at the Balance Room, S.P.J. Scientific Co., Ltd.

Ambient Temperature : (21.5 to 21.7) °C

Relative Humidity : (35.6 to 38.5) %

Air Pressure : 1005.0 mbar

Date of Received : 20 June 2024

Date of Calibration : 20 June 2024

Date of Issue : 26 June 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.	Cert. No.	Due Date	Traceability
E261-E2624	C02232088	08 Nov 2024	National Institute of Metrology (Thailand), (NIMT)

Approved by :

(Surachai Promthong)

Laboratory Manager

The Uncertainties are for a confidence probability of approximately 95%

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CAL

Calibratech Co.,Ltd.

7/106-7 Moo 2, Sukhprachasan 3 Rd., Bangpood, Pakkred, Nonthaburi 11120

Tel.(02) 964-6211 Fax.(02) 964-5155, e-mail : calibratech_cal@yahoo.com, calibratech_cal@hotmail.com

Certificate of Calibration

Certificate No. : 67-200227-1

Page : 2 of 2

Result of Calibration : Without Adjustment

UUC Condition As-Received : Good

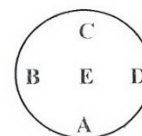
Departure of indication from nominal value

Nominal Value (g)	Correction (g)	Uncertainty \pm (g)
0.001	0.00000	0.000015
0.01	0.00000	0.000016
0.1	0.00000	0.000018
1	0.00000	0.000026
5	-0.00001	0.000043
10	0.00000	0.000053
20	-0.00002	0.000071
50	0.0001	0.00016
100	0.0002	0.00021
120	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 $k = 2.13$, providing a level of confidence of approximately 95%

Eccentric error Load test : 20 g
A B C D E
0.00001 0.00002 0.00005 -0.00001 0.00000 g



Repeatability Load test : 100 g
Stdev. : 0.000052 g

- o0o -




CALIBRATION REPORT

Issued By B.T.METROLOGY CO.,LTD.
Date of Issue 22 July 2023



Cert. Number
BTC-T-04/66
Page 1 of 4 pages

B.T.METROLOGY CO.,LTD.
17/166 Soi Prachachun 14 (PEA Village)
Tungsonghong Laksi, Bangkok 10210

Approved Signatory

P.Prasitamate

Customer : S.P.J.Scientific Co.,Ltd.

Address : 80, Soi Nakkeela Laem Thong 3,Thap Chang Subdistrict, Saphan Sung District, Bangkok 10250

Date of Received : 21 July 2023

Instrument – Description : COD REACTOR

Id. Number : N/A
Manufacturer : HANNA
Model Number : HI839800
Serial Number : 08090031111

Calibration Procedure : Indicate temperature of Unit Under Test (UUC) was compared to temperature Obtained from reference standards at calibration point.

Measurement Method : The thermocouples shall be placed with in the chamber in accordance with the appendix A and the temp. readings of the thermocouples could be found in the appendix A.

Cal. Inform. : Cal. (✓) Only () Adjusted

Location of Calibration : At Customer Location

Environmental Conditions :

Temperature is $27 \pm 3^{\circ}\text{C}$

Relative Humidity is $60 \pm 10\% \text{ Rh}$

Comments

The temperature scale in use is the International Temperature Scale of 1990 (ITS-90).
The Uncertainties of report based on a standard uncertainty Multiplied by a coverage factor $k=2$,
Providing level of confidence approximately 95%
All Tests pass standard tolerance.

Tractability Information

Reference Standards Description	Serial Number	Certificate Number	Cal. Date	Due Date.
STD Thermometer with Probe, PRT	1912	22-65/0709	7-9/September/2022	7-9/September/2023
Equipment Description	Serial Number	Certificate Number	Cal. Date	Dule Date.
Data logger With Probe (RTD : 01-10)	MY49020096	BTC-T-001-66	1/February/2023	1/February/2024
	Maker: Agilent	Model: 34972A	Make in USA	

This certification is traceable to SI Unit through the reference standard laboratory of In-house B.T.Metrology Calibration Lab.
The used to perform this calibration is Traceable to National Institute of Metrology (Thailand), NIMT through Reference Standard Laboratory of Thailand Institute of Scientific and Technological Research (TISTR), No. Calibration 0260.(Laboratories was Accreditation by TISI According to ITS ISO / IEC 17025

Calibrated By:


(Mr. Boonlue Somprajob)

Date of Calibration : 21 July 2023

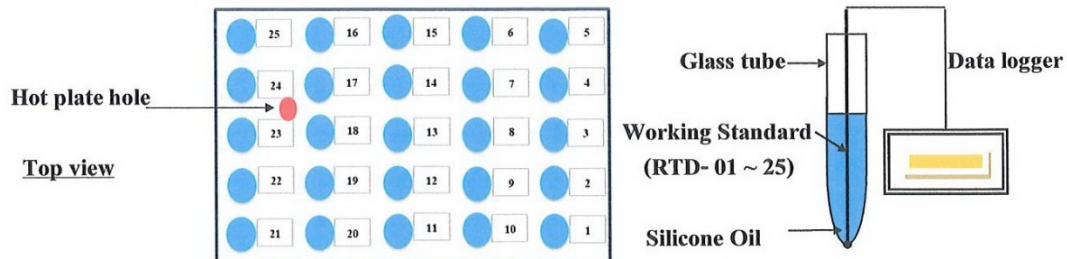
CALIBRATION REPORT

Issued By B.T.METROLOGY CO.,LTD.
Date of Issue 22 July 2023

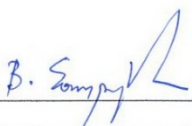


Cert. Number
BTC-T-04/66
Page 2 of 4 pages

Appendix A.



Calibrated By:


(Mr. Boonlue Somprajob)

Date of Calibration : 21 July 2023

CALIBRATION REPORT

Issued By B.T.METROLOGY CO.,LTD.
Date of Issue 22 July 2023



Cert. Number
BTC-T-04/66
Page 3 of 4 pages

MPE ± 1.2

Hole No. (Position)	Max (°C)	Min (°C)	Mid-Range (°C)	Difference (°C)	Uncertainty of measurement (\pm °C)	Error/Unce	Compared
1	149.10	148.90	149.00	0.23		0.93	/
2	149.00	148.80	148.90	0.19		0.99	/
3	148.90	148.80	148.85	0.19		0.69	/
4	148.80	148.60	148.70	0.21		0.91	/
5	148.90	148.70	148.80	0.22		0.92	/
6	149.80	149.50	149.65	0.28		0.96	/
7	148.80	148.60	148.70	0.25		0.95	/
8	150.70	150.40	150.55	0.30		1.00	/
9	150.70	150.40	150.55	0.28		0.96	/
10	150.50	150.10	150.30	0.41		1.11	/
11	149.10	148.80	148.95	0.25		0.95	/
12	150.90	150.20	150.55	0.63		1.33	/
13	151.50	151.00	151.25	0.52		1.22	/
14	151.00	150.60	150.80	0.37	0.7	1.04	/
15	149.90	149.60	149.75	0.31		1.01	/
16	150.70	150.20	150.45	0.54		1.24	/
17	150.00	149.70	149.85	0.29		0.99	/
18	149.80	149.40	149.60	0.37		1.04	/
19	150.50	150.00	150.25	0.47		1.14	/
20	148.70	148.50	148.60	0.16		0.86	/
21	149.60	149.40	149.50	0.22		0.92	/
22	149.20	149.00	149.10	0.21		0.91	/
23	149.30	149.10	149.20	0.24		0.94	/
24	149.60	149.40	149.50	0.22		0.92	/
25	149.00	148.50	148.75	0.59		1.29	/
Hot plate hole	150.30	149.60	149.95	0.62		1.32	/

Calibrated By:

B. Somprajob
(Mr. Boonlue Somprajob)

Date of Calibration : 21 July 2023

Verified
mm. 800
261 4166

CALIBRATION REPORT

Issued By B.T.METROLOGY CO.,LTD.
Date of Issue 22 July 2023



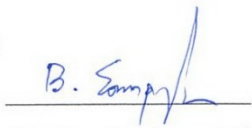
Cert. Number
BTC-T-04/66
Page 4 of 4 pages

UUC		Average Measured Temperature * (°C)	Measured Temperature		Measured Variation		
Setting (°C)	Reading (°C)		Max (°C)	Min (°C)	Stability (±°C)	Uniformity (°C)	Overall (°C)
150.0	148.5-151.5	149.6	151.5	148.5	0.3	2.7	3.0

Note : - Reference Standards are measurement in tube silicone oil at 240 value record after temperature stability.
- Level high of silicone oil is equal heater plate of UUC.

... end of certificate ...

Calibrated By:


(Mr. Boonlue Somprajob)

Date of Calibration : 21 July 2023

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CAL

Calibratech Co.,Ltd.

7/106-7 Moo 2, Sukhprachasan 3 Rd., Bangpood, Pakkred, Nonthaburi 11120

Tel.(02) 964-6211 Fax.(02) 964-5155, e-mail : calibratech.cal@yahoo.com, calibratech.cal@hotmail.com



NSC-TISI-TIS 17025
CALIBRATION 0030

Certificate of Calibration

Certificate No. : 67-400360-3

Page : 1 of 2

Submitted by : S.P.J. Scientific Co., Ltd.
80 Soi Nakkilalaemthong 3, Thapchang, Saphansung, Bangkok 10250

Equipment : Temperature controlled enclosure (Ovenr)
Manufacturer : Memmert
Model : UF55
Range : N/A °C
Resolution : 0.1 °C
Serial No. : B221.0746
ID No. : SPJ-TE-049

Environment : On site calibration was carried out at the Laboratory, S.P.J. Scientific Co., Ltd.
Ambient Temperature : (31.0 to 33.0) °C
Relative Humidity : (40 to 45) %
Line Voltage : (232.0 to 233.0) V

Date of Received : 20 June 2024

Date of Calibration : 20 June 2024

Date of Issue : 27 June 2024

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	67-400246-1	25 Oct 2024	National Institute of Metrology Thailand (NIMT)

Approved by :

(Surachai Promthong)

Laboratory Manager

The Uncertainties are for a confidence probability of approximately 95%

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Calibratech Co.,Ltd.

7/106-7 Moo 2, Sukhaphrachasan 3 Rd., Bangpood, Pakkred, Nonthaburi 11120

Tel.(02) 964-6211 Fax.(02) 964-5155, e-mail : calibratech_cal@yahoo.com, calibratech_cal@hotmail.com

Certificate of Calibration

Certificate No. : 67-400360-3

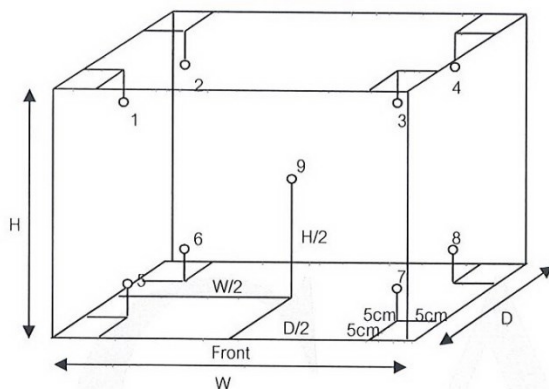
Page : 2 of 2

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 m³

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	
104.0	104.0	104.0	104.1	103.9	103.9	103.7	104.1	104.1	103.9	103.7	104.1	0.69
180.0	180.0	180.0	180.4	180.2	180.2	179.6	180.8	180.7	180.4	179.9	180.8	0.95

Test Point (°C)	Setting Temperature (°C)	Indicating Temperature (°C)	Measured Uniformity (°C)	Measured Stability (°C)	Overall Variation (°C)
104.0	104.0	104.0	0.5	0.1	0.5
180.0	180.0	180.0	1.3	0.1	1.4

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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AB



CAL

Calibratech Co.,Ltd.

7/106-7 Moo 2, Sukhprachasan 3 Rd., Bangpood, Pakkred, Nonthaburi 11120

Tel.(02) 964-6211 Fax.(02) 964-5155, e-mail : calibratech.cal@yahoo.com, calibratech_cal@hotmail.com



NSG-TISI-TIS17025
CALIBRATION 0030

Certificate of Calibration

Certificate No. : 67-400360-2

Page : 1 of 2

Submitted by : S.P.J. Scientific Co., Ltd.
80 Soi Nakkilalaemthong 3, Thapchang, Saphansung, Bangkok 10250

Equipment : Temperature controlled enclosure (Incubator)
Manufacturer : N/A Model : N/A
Range : N/A °C Resolution : 0.1 °C
Serial No. : N/A ID No. : SPJ-TE-028

Environment : On site calibration was carried out at the Laboratory, S.P.J. Scientific Co., Ltd.
Ambient Temperature : (26.0 to 26.5) °C
Relative Humidity : (40 to 45) %
Line Voltage : (232.0 to 233.0) V

Date of Received : 20 June 2024

Date of Calibration : 20 June 2024


Date of Issue : 27 June 2024

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 RTD Probe

<u>ID No.</u>	<u>Cert. No.</u>	<u>Due Date</u>	<u>Traceability</u>
400029 & 400043	67-400245-1	27 Oct 2024	National Institute of Metrology Thailand (NIMT)

Approved by : 
(Surachai Promthong)
Laboratory Manager

The Uncertainties are for a confidence probability of approximately 95%

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Calibratech Co.,Ltd.

7/106-7 Moo 2, Sukhprachasan 3 Rd., Bangpood, Pakkred, Nonthaburi 11120

Tel.(02) 964-6211 Fax.(02) 964-5155, e-mail : calibratech_cal@yahoo.com, calibratech_cal@hotmail.com

Certificate of Calibration

Certificate No. : 67-400360-2

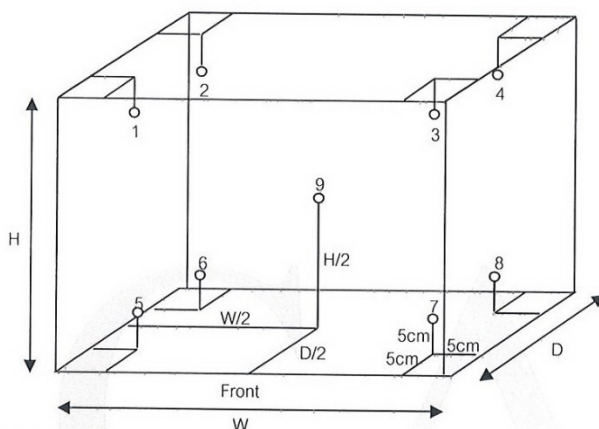
Page : 2 of 2

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 = 0.68 m

D = 0.55 m

H = 1.27 m

Capacity = 0.47 m³

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	19.59	19.62	19.94	20.51	19.54	19.72	20.31	20.48	20.04	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	0.60	0.07	1.09

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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ABJ



CAL

Calibratech Co.,Ltd.

7/106-7 Moo 2, Sukhprachasan 3 Rd., Bangpood, Pakkred, Nonthaburi 11120

Tel.(02) 964-6211 Fax.(02) 964-5155, e-mail : calibratech.cal@yahoo.com, calibratech.cal@hotmail.com



NSC-TISI-TIS 17025
CALIBRATION 0030

Certificate of Calibration

Certificate No. : 67-420060-1

Page : 1 of 2

Submitted by : S.P.J. Scientific Co., Ltd.

80 Soi Nakkilalaemthong 3, Thapchang, Saphansung, Bangkok 10250

Equipment : pH Meter with electrode

pH meter

Manufacturer : Hach

Model : HQ11D

Range : 0.00 to 14.00 pH

Resolution : 0.01 pH

Serial No. : N/A

ID No. : SPJ-TE-045

Electrode

Model : PHC101

Serial No. : 220772562511

ID No. : SPJ-TE-045

Environment : On site calibration was carried out at the Laboratory, S.P.J. Scientific Co., Ltd.

Ambient Temperature : (40 to 45) °C

Relative Humidity : 232.0 to 233.0 %

Date of Received : 20 June 2024

Date of Calibration : 20 June 2024

Date of Issue : 27 June 2024

Calibrated by : Permpon Chanpu

Calibration Method : In-house method CAL-M4201 direct measurement by using certified reference material (CRM)

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

Standard Buffer Solution

pH	Cert. No.	Lot No.	Exp. Date	Traceability
4.008	61293328	986281	25 Apr 2026	CPA Chem Ltd. Accredited to ISO 17034 and ISO/IEC 17025
6.986	61281486	986283	25 Apr 2025	CPA Chem Ltd. Accredited to ISO 17034 and ISO/IEC 17025
9.997	61281073	986282	25 Apr 2025	CPA Chem Ltd. Accredited to ISO 17034 and ISO/IEC 17025

Approved by :

(Surachai Promthong)

Laboratory Manager

The Uncertainties are for a confidence probability of approximately 95%

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Calibratech Co.,Ltd.

7/106-7 Moo 2, Sukhprachasan 3 Rd., Bangpood, Pakkred, Nonthaburi 11120

Tel.(02) 964-6211 Fax.(02) 964-5155, e-mail : calibratech_cal@yahoo.com, calibratech_cal@hotmail.com

Certificate of Calibration

Certificate No. : 67-420060-1

Page : 2 of 2

Result of Calibration :

UUC Condition As-Received : Good

Function : pH meter with electrode

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

Adjustment Curve at nominal pH	Standard Buffer (pH)	UUC Reading (pH)	Correction (pH)	Uncertainty (± pH)
4, 7, 10	4.008	4.01	0.00	0.0097
	6.986	7.00	-0.01	0.011
	9.997	10.01	-0.01	0.014

Remark

1 UUC : Unit Under Calibration

2 pH meter does not have voltage mode because the plug can not BNC socket

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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PAI





SCIMET Co., Ltd.

1194 Soi Wachirathamsathit 57, Bangchak,
Phrakhanong, Bangkok 10260 Thailand
Email:scimet2022@gmail.com, Tel: 02 460 9239
https://www.scimet.co.th



Certificate No. C08240060

Calibration Certificate

Equipment:	pH METER	Job No.:	KSMT2401020
Model:	FiveEasy F20	Received Date:	13 May 2024
Serial No.(or ID):	C242075213 (SPJ-TE-065)	Issued Date:	13 May 2024
Manufacturer:	Mettler Toledo	Page:	1 of 3
Condition:	In Condition		

Customer

S.P.J. SCIENTIFIC COMPANY LIMITED
80 Soi Nakkilalaemthong 3, Thab Chang, Saphansoong, Bangkok 10250

Calibration Place

S.P.J. SCIENTIFIC COMPANY LIMITED(Lab 4 Cool Room)
80 Soi Nakkilalaemthong 3, Thab Chang, Saphansoong, Bangkok 10250

Calibration Date

13 May 2024

Environment Condition

Temperature: 22.7 °C ± 0.7 °C
Humidity: 52.3 %RH ± 2.7 %RH

The Method used

In-house method, WI08, based on ASTM E 70-07

Traceability

This certificate is traceable to SI Units, Sample Test is assured through primary measurement method Harned cell, through CPAchem Ltd. (ISO17034) Certificate No. 938374, 938376, 938375, pH Scale and Temperature test are traceable to the SI Units maintained by National Institute of Metrology (NIMT), Thailand through Industrial Foundation Electrical and Electronics Institute Certificate No. CA20230443EA, through SCIMET Co., Ltd. Certificate No.C23240041

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 SCIMET Co., Ltd.

(Mr. Dumrong Boonsopon)

Person in charge



(Mr. Thalerngkeat Pongngam)

Authorized signatory



Calibration Results:

pH Scale

Input (mV)	pH Meter Reading			Uncertainty of Measurement (mV)	Coverage Factor (<i>k</i>)
	(mV)	Error (mV)	(pH)		
414.12	414	-0.12	0.00	0.58	2.00
354.96	355	0.04	1.00	0.58	2.00
295.80	296	0.20	2.00	0.58	2.00
236.64	237	0.36	3.01	0.58	2.00
177.48	177	-0.48	4.01	0.58	2.00
118.32	118	-0.32	5.00	0.58	2.00
59.16	59	-0.16	6.00	0.58	2.00
0.00	0	0.00	7.00	0.58	2.00
-59.16	-59	0.16	8.01	0.58	2.00
-118.32	-118	0.32	9.00	0.58	2.00
-177.48	-177	0.48	10.01	0.58	2.00
-236.64	-237	-0.36	11.01	0.58	2.00
-295.80	-296	-0.20	12.01	0.58	2.00
-354.96	-355	-0.04	13.01	0.58	2.00
-414.12	-414	0.12	14.00	0.58	2.00



Electrode Test Results*

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

-During calibration, display of pH meter reading pH4.01 , pH7.00 and pH10.01

The practical slope of the pH electrode; 58.56 (mV/pH), 98.99%

The zero point of the pH electrode; 7.05 (pH)

Sample Test Results

Electrode Serial No.: 4131602
Model: LF438
Manufacturer: Mettler Toledo

Standard Buffer Solution (pH)	Unit Under Calibration (pH)	Difference (pH)	Uncertainty of Measurement (pH)	Coverage Factor (<i>k</i>)
4.008	4.00	-0.008	0.0084	2.04
6.985	7.00	0.015	0.0093	2.00
9.997	10.01	0.013	0.0098	2.00

Temperature Electrode

Dimension of Probe;

Length : 120 mm
Diameter : 12 mm
Immersion Depth : 80 mm

STD. Reading (°C)	UUC. Reading (°C)	Correction of UUC (°C)	Uncertainty of Measurement (±°C)	Coverage Factor (<i>k</i>)
25.01	25.1	-0.09	0.20	2.00

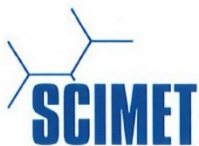
* Calibration Marked for Electrode Test" Not TISI Accredited " in this Certificate have been included for completeness.

The End of Certificate

บริษัท ชายนันเมท จำกัด (SCIMET CO., LTD.)

1194 Soi Wachirathamsathit 57, Bangchak, Phrakhanong, Bangkok 10260 Thailand
Email: scimet2022@gmail.com, Tel: 02 460 9239

FC08-03: 30 MAY 2023



Certificate No.: C08240060

Page 1 of 2

Statements of conformity:

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

The error of temperature determined during calibration are under given measurement and environmental conditions and considering the expanded measurement uncertainty (coverage probability 95%) within the specification. The given measurement uncertainty already includes other all effects by according to the standard method, ASTM E 70-07. Therefore, those parameters have not been assessed separately.

Tolerance and Decision rules:

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

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



(Mr. Thalerngkeat Pongngam)

Authorized signatory

บริษัท ชายนันเมท จำกัด (SCIMET CO., LTD.)

1194 Soi Wachirathamsathit 57, Bangchak, Phrakhanong, Bangkok 10260 Thailand
Email: scimet2022@gmail.com, Tel: 02 460 9239

FC08-03: 30 MAY 2023



pH Scale

Tolerance : 2 mV

Input (mV)	pH Meter Reading			Guard Band (w) (mV)	Tolerance (mV)	Conformity
	(mV)	Error (mV)	(pH)			
414.12	414	-0.12	0.00	0.58	2.0	Pass
354.96	355	0.04	1.00	0.58	2.0	Pass
295.80	296	0.20	2.00	0.58	2.0	Pass
236.64	237	0.36	3.01	0.58	2.0	Pass
177.48	177	-0.48	4.01	0.58	2.0	Pass
118.32	118	-0.32	5.00	0.58	2.0	Pass
59.16	59	-0.16	6.00	0.58	2.0	Pass
0.00	0	0.00	7.00	0.58	2.0	Pass
-59.16	-59	0.16	8.01	0.58	2.0	Pass
-118.32	-118	0.32	9.00	0.58	2.0	Pass
-177.48	-177	0.48	10.01	0.58	2.0	Pass
-236.64	-237	-0.36	11.01	0.58	2.0	Pass
-295.80	-296	-0.20	12.01	0.58	2.0	Pass
-354.96	-355	-0.04	13.01	0.58	2.0	Pass
-414.12	-414	0.12	14.00	0.58	2.0	Pass

Sample Test

Tolerance : 0.05 pH

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

Standard Buffer Solution (pH)	Unit Under Calibration (pH)	Difference (pH)	Guard band (w) (pH)	Tolerance (pH)	Conformity
4.008	4.00	-0.008	0.0084	0.050	Pass
6.985	7.00	0.015	0.0093	0.050	Pass
9.997	10.01	0.013	0.0098	0.050	Pass

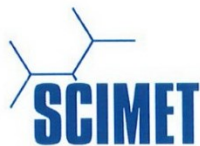
The validity of the statements of conformity cannot be guaranteed for different places of use, environmental conditions or improper use.

The End of Statements of Conformity

บริษัท ชายนันเมท จำกัด (SCIMET CO., LTD.)

1194 Soi Wachirathamsathit 57, Bangchak, Phrakhanong, Bangkok 10260 Thailand
Email: scimet2022@gmail.com, Tel: 02 460 9239

FC08-03: 30 MAY 2023



ใบตรวจสอบสภาพเครื่อง pH Meter

เลขที่ใบงาน: KSMT2401020

ชนิดเครื่องมือ: pH METER

รุ่น: FiveEasy F20

หมายเลขเครื่อง: C242075213

ตรวจสอบ (รับ)		รายการตรวจเช็ค	ตรวจสอบ (ส่ง)		หมายเหตุ
13 May 2024			13 May 2024		
ปกติ	ไม่ปกติ		ปกติ	ไม่ปกติ	
<input checked="" type="checkbox"/>	<input type="checkbox"/>	1. ความสมบูรณ์เครื่อง	<input checked="" type="checkbox"/>	<input type="checkbox"/>	
<input checked="" type="checkbox"/>	<input type="checkbox"/>	2. ความสะอาด (ช่องใส่ตัวอย่าง, ภายใน-นอกเครื่อง)	<input checked="" type="checkbox"/>	<input type="checkbox"/>	
<input checked="" type="checkbox"/>	<input type="checkbox"/>	3. สวิตช์ ปิด – เปิด เครื่อง (On-Off Swicth)	<input checked="" type="checkbox"/>	<input type="checkbox"/>	
<input checked="" type="checkbox"/>	<input type="checkbox"/>	4. ปุ่มกด (Keypad)	<input checked="" type="checkbox"/>	<input type="checkbox"/>	
<input checked="" type="checkbox"/>	<input type="checkbox"/>	5. หน้าจอ (Display, Screen Contrast)	<input checked="" type="checkbox"/>	<input type="checkbox"/>	
<input checked="" type="checkbox"/>	<input type="checkbox"/>	6. อิเล็กโทรด (Electrode and Connection Cable)	<input checked="" type="checkbox"/>	<input type="checkbox"/>	
<input checked="" type="checkbox"/>	<input type="checkbox"/>	7. สายอิเล็กโทรด	<input checked="" type="checkbox"/>	<input type="checkbox"/>	
<input checked="" type="checkbox"/>	<input type="checkbox"/>	8. ระดับสารละลายใน Electrode (Level KCl)	<input checked="" type="checkbox"/>	<input type="checkbox"/>	
<input checked="" type="checkbox"/>	<input type="checkbox"/>	9. ฝาปิดกันปลาย Electrode (Dust Protection Hood)	<input checked="" type="checkbox"/>	<input type="checkbox"/>	
<input checked="" type="checkbox"/>	<input type="checkbox"/>	10. ขาจับอิเล็กโทรด (Stand)	<input checked="" type="checkbox"/>	<input type="checkbox"/>	

เพิ่มเติม/ขอแนะนำ :

Mr. Dumrong Boonsopon
Service Engineer

บริษัท ชายนันเมก จำกัด (SCIMET CO., LTD.)

1194 Soi Wachirathamsathit 57, Bangchak, Phrakhanong, Bangkok 10260 Thailand
Email: scimet2022@gmail.com, Tel: 02 460 9239

FI08-01: 08 MAR 2023

CAL

Calibratech Co.,Ltd.

7/106-7 Moo 2, Sukhprachasan 3 Rd., Bangpood, Pakkred, Nonthaburi 11120

Tel.(02) 964-6211 Fax.(02) 964-5155, e-mail : calibratech.cal@yahoo.com, calibratech.cal@hotmail.com



NSC-TISI-TIS17025
CALIBRATION 0030

Certificate of Calibration

Certificate No. : 67-400360-1

Page : 1 of 2

Submitted by : S.P.J. Scientific Co., Ltd.
80 Soi Nakkilalaemthong 3, Thapchang, Saphansung, Bangkok 10250

Equipment : Temperature controlled enclosure (Refrigerator)
Manufacturer : N/A Model : N/A
Range : N/A °C Resolution : 0.1 °C
Serial No. : N/A ID No. : SPJ-TE-014

Environment : On site calibration was carried out at the Laboratory, S.P.J. Scientific Co., Ltd.
Ambient Temperature : (30.0 to 31.0) °C
Relative Humidity : (50 to 55) %
Line Voltage : (232.0 to 233.0) V

Date of Received : 20 June 2024

Date of Calibration : 20 June 2024

Date of Issue : 27 June 2024

Calibrated by : Kittisak Kokaco

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	Traceability
400046 & 400042	67-400047-1	25 Jul 2024	National Institute of Metrology Thailand (NIMT)

Approved by :

(Surachai Promthong)

Laboratory Manager

The Uncertainties are for a confidence probability of approximately 95%

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CAL

Calibratech Co.,Ltd.

7/106-7 Moo 2, Sukhprachasan 3 Rd., Bangpood, Pakkred, Nonthaburi 11120

Tel.(02) 964-6211 Fax.(02) 964-5155, e-mail : calibratech_cal@yahoo.com, calibratech_cal@hotmail.com

Certificate of Calibration

Certificate No. : 67-400360-1

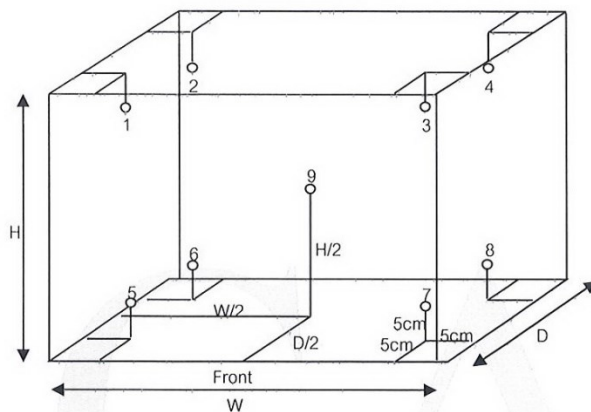
Page : 2 of 2

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 = 1.18 m

D = 0.56 m

H = 1.34 m

Capacity = 0.89 m³

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	
4.0	4.0	4.0	4.25	3.98	3.99	3.68	3.80	3.27	3.78	3.27	3.69	0.34

Test Point (°C)	Setting Temperature (°C)	Indicating Temperature (°C)	Measured Uniformity (°C)	Measured Stability (°C)	Overall Variation (°C)
4.0	4.0	4.0	0.7	0.1	1.1

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%

- o0o -

ABJ



CAL

Calibratech Co.,Ltd.

7/106-7 Moo 2, Sukhprachasan 3 Rd., Bangpood, Pakkred, Nonthaburi 11120

Tel.(02) 964-6211 Fax.(02) 964-5155, e-mail : calibratech_cal@yahoo.com, calibratech_cal@hotmail.com



NSC-TISI-TIS 17025
CALIBRATION 0030

Certificate of Calibration

Certificate No. : 67-400360-4

Page : 1 of 2

Submitted by : S.P.J. Scientific Co., Ltd.
80 Soi Nakkilalaemthong 3, Thapchang, Saphansung, Bangkok 10250

Equipment : Water Bath
Manufacturer : Memmert Model : WTB24
Range : N/A °C Resolution : 0.1 °C
Serial No. : LD21.0340 ID No. : SPJ-TE-050

Environment : On site calibration was carried out at the Laboratory, S.P.J. Scientific Co., Ltd.
Ambient Temperature : (30.0 to 31.0) °C
Relative Humidity : (50 to 55) %
Line Voltage : (232.0 to 233.0) V

Date of Received : 20 June 2024

Date of Calibration : 20 June 2024

Date of Issue : 27 June 2024

Calibrated by : Kittisak Kokaeo

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

<u>ID No.</u>	<u>Cert. No.</u>	<u>Due Date</u>	<u>Traceability</u>
400046 & 400024	67-400198-2	30 Sep 2024	National Institute of Metrology Thailand (NIMT)

Approved by :

(Surachai Promthong)

Laboratory Manager

The Uncertainties are for a confidence probability of approximately 95%

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Calibratech Co.,Ltd.

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Tel.(02) 964-6211 Fax.(02) 964-5155, e-mail : calibratech_cal@yahoo.com, calibratech_cal@hotmail.com

Certificate of Calibration

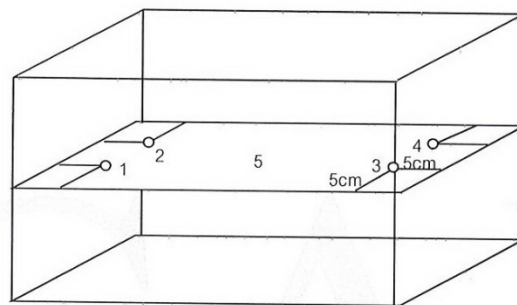
Certificate No. :67-400360-4

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					Uncertainty (± ° C)	Measured Uniformity (° C)	Measured Stability (° C)
			No.							
			1	2	3	4	5			
85.0	85.0	85.0	85.12	85.19	84.99	85.04	85.07	0.24	0.25	0.13
95.0	95.0	95.0	95.07	95.17	94.98	95.03	95.05	0.28	0.30	0.18

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%

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THAI HEART CALIBRATION CO., LTD.

112/1 Moo 5, Phraek Sa, Muang, Samut Prakan 10280
Tel. 0-2394-2162, 0-2757-8435, 0-2757-8496 Fax. 0-2757-8507



CERTIFICATE OF CALIBRATION

Certificate No.: C0-2012001/23

Page 1 of total 3 pages

Customer S.P.J. SCIENTIFIC COMPANY LIMITED
80 Soi Nakkilalaemthong 3, Thap Chang,
Saphansoong, Bangkok 10250 Thailand.

Equipment	Spectrophotometer	Model	DR 3900
Manufacturer	HACH	ID No.	SPJ-TE-051
Serial No.	2106441		
Description	-		

Environmental Conditions Ambient Temperature: $(20 \pm 2) ^\circ\text{C}$
Relative Humidity: $(50 \pm 10) \%$
Atmospheric Pressure: -

Calibration Location Jayhawks Laboratory (CL&GL)

Received Date 20 December 2023

Calibration Date 21 December 2023

Date of Issue 21 December 2023

Condition of Artifacts Used conditions but can be calibrated

Checked by

Act as Technical Manager

Approved by

Representative of Managing Director

<input type="checkbox"/> (Krisyosl K.)	<input type="checkbox"/> (Sakda Y.)
<input type="checkbox"/> (Patiphan K.)	<input checked="" type="checkbox"/> (Onnapa P.)
<input type="checkbox"/> (Pongsak H.)	<input type="checkbox"/> (Nitiphong K.)
<input type="checkbox"/> (Kanung C.)	<input type="checkbox"/> (Nonthachai K.)
<input type="checkbox"/> (Pramong P.)	<input type="checkbox"/> (Noppol P.)

(Dr. Ekachai Puttitwong)

This calibration certificate shall not be reproduced other than in full except with the prior written approval of the Thai Heart Calibration Co., Ltd.

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REV.02 02/24/21



THAI HEART CALIBRATION CO., LTD.

112/1 Moo 5, Phraek Sa, Muang, Samut Prakan 10280
Tel. 0-2394-2162, 0-2757-8435, 0-2757-8496 Fax: 0-2757-8507



Certificate No.: C0-2012001/23

Page 2 of total 3 pages

Reference Method:

- The calibration method used was CP-004 based on an in-house method.
- This certificate can be traceable to the national standards, which is realized the shown measurement units according to the International System of Units (SI Units).

Reference Standard Instruments:

Type	Model	Serial No.	Certificate No.	Due Date	Traceability
Holmium Glass Filter	RM-HG	34645	100503	Mar. 25, 2024	Starna
Didymium Glass Filter	RM-DG	11978	100499	Mar. 25, 2024	
Neutral Density Filter	RM-1N2N3N	11562	100582	Mar. 30, 2024	

Remark: This certificate is traceable to the International System of Unit (SI Unit) through:

- Starna Scientific Ltd.

Measurement Results:

Spectral Bandwidth : 5 nm, Scan Speed : -, Data Interval : 1 nm

1. Wavelength accuracy

Standard Wavelength (nm)	UUC Reading (nm)	Correction (nm)	Uncertainty (± nm)
361.40	360	1.40	0.59
537.00	536	1.00	0.59
879.68	881	-1.32	0.59



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Certificate No.: C0-2012001/23

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Measurement Results (Cont.):

2. Photometric Accuracy

Visible Region

Wavelength (nm)	Standard Value (A)	UUC Reading (A)	Correction (A)	Uncertainty (± A)
420	1.0572	1.054	0.0032	0.0033
	0.7481	0.753	-0.0049	0.0033
	0.5529	0.547	0.0059	0.0033
440	1.0353	1.027	0.0083	0.0034
	0.7311	0.727	0.0041	0.0033
	0.5432	0.538	0.0052	0.0032
465	0.9650	0.967	-0.0020	0.0034
	0.6749	0.678	-0.0031	0.0035
	0.4937	0.492	0.0017	0.0034
546.1	0.9959	0.990	0.0059	0.0034
	0.6850	0.684	0.0010	0.0035
	0.5082	0.501	0.0072	0.0035
590	1.0356	1.026	0.0096	0.0035
	0.7147	0.706	0.0087	0.0036
	0.5369	0.530	0.0069	0.0036
635	0.9878	0.984	0.0038	0.0033
	0.6826	0.676	0.0066	0.0040
	0.5216	0.513	0.0086	0.0036

UUC : Unit Under Calibration.

The above reported uncertainty of measurement is the expanded uncertainty obtained by multiplying the standard uncertainty with the coverage factor $k = 2.00$, providing a level of confidence approximately 95%.

- End of Certificate -

Calibrated by Kittipong
REV.02 02/24/21