



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



Certificate of Calibration

Cert.No.: 24CH792

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Equipment : pH Meter
Manufacturer : Mettler Toledo
Model : SevenCompact pH/Ion S220
Serial No. : B329579021
ID No. : TLC-L020
Condition As-Received: Used Item
Received Date : 02 July 2024
Calibration Date : 03 July 2024
Reference : 2407-0055DN-1
Submitted by : Tops-Lab Consultants Co.,Ltd.
189 Moo. 3, Bangrakphatthana,
Bangbuathong, Nonthaburi 11110

Ambient Temperature : (25 ± 2.5) °C
Relative Humidity : (50 ± 15) %
Calibration Procedure : In - house method :
- CP-CH5 by direct measurement with DC voltage
standard and direct measurement with
certified reference material (CRM)
- CP-CH8 by comparison with temperature standard

Issue Date :

09 July 2024

The Uncertainties are for a confidence probability of approximately 95%

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



Cert.No.: 24CH792

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Condition of this calibration result

1. Reference Standard Instrument

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

- This Certification is traceable to SI Through Technology Promotion Association (Thailand - Japan)

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

<u>Buffer Solution</u>	<u>Manufacturer</u>	<u>Lot No.</u>	<u>Exp. date</u>
pH 4.008	CPA chem	970851	25 Apr 2026
pH 6.986	CPA chem	970852	25 Apr 2025
pH 9.997	CPA chem	970853	25 Apr 2025

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

Calibration Results

Function : mV Measurement

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

Unit Under Calibration	Nominal Value	Standard Voltage Input	Actual Reading		Uncertainty of Measurement (±mV)	Coverage factor <i>k</i>
	pH	mV	mV	pH		
pH Meter S/N.: B329579021	4.000	177.48	177.2	4.000	0.058	2.00
	7.000	0.00	-0.2	7.000	0.058	2.00
	10.000	-177.48	-177.6	10.000	0.058	2.00



Cert.No.: 24CH792

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Calibration Results

Function : pH Measurement

Performing three buffers standard curve by using buffer nominal pH (4,7,10)

Unit Under Calibration	Standard pH Buffer Solution	Actual pH Reading	Actual mV Reading (mV)	Uncertainty of pH Measurement (\pm)	Coverage factor k
pH Electrode S/N.: 4222298	4.008	4.007	184.4	0.0047	2.00
	6.986	6.995	9.2	0.0084	2.00
	9.997	10.002	-166.3	0.0074	2.05

Function : Temperature Measurement

(*) Without adjustment

This equipment was connected with Temperature Probe;

- Model : InLab®Expert Pro-ISM

- Serial No. : 4222298

Dimension of probe

- Length : 120 mm.

- Diameter : 12 mm.

- Immersion Depth : 100 mm.

Calibration Point (°C)	Standard Temperature (°C)	UUC* Reading (°C)	Error (°C)	Uncertainty of measurement (\pm °C)	Coverage factor k
23.0	23.003	23.0	-0.003	0.13	2.00
25.0	25.002	25.0	-0.002	0.13	2.00
27.0	27.004	27.0	-0.004	0.13	2.00

Remark - UUC* = Unit Under Calibration

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

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Certificate of Calibration

Certificate No. : 68-400225-2

Page : 1 of 2

Submitted by : Tops-Lab Consultants Co.,Ltd.
189 Moo 3 Bangrakphatthana, Bangbuathong, Nonthaburi 11110

Equipment : Temperature controlled enclosure (Incubator)
Manufacturer : Aqualytic Model : ET 618-4
Range : N/A °C Resolution : 0.1 °C
Serial No. : 0109/13922 ID No. : TLC-L005

Environment : On site calibration was carried out at the Laboratory, Tops-Lab Consultants Co.,Ltd.
Ambient Temperature : (24.0 to 24.5) °C
Relative Humidity : (40 to 45) %
Line Voltage : (220.0 to 228.0) V

Date of Received : 21 April 2025

Date of Calibration : 21 April 2025

Date of Issue : 23 April 2025

Calibrated by : [REDACTED]

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
400029 & 400048	68-400063-1	01 Aug 2025	National Institute of Metrology Thailand (NIMT)

The Uncertainties are for a confidence probability of approximately 95%

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Certificate of Calibration

Certificate No. : 68-400225-2

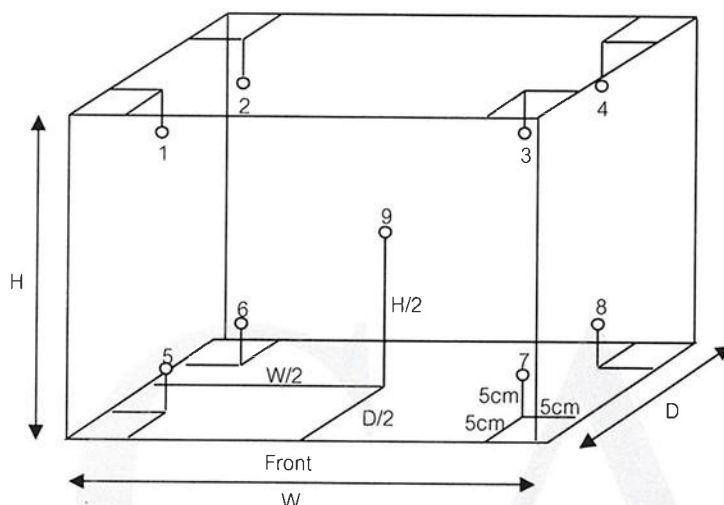
Page : 2 of 2

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 = 0.55 m

D = 0.48 m

H = 0.72 m

Capacity = 0.19 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	20.02	19.83	19.79	19.82	19.77	19.72	19.85	19.84	19.80	0.58

Test Point (°C)	Setting Temperature (°C)	Indicating Temperature (°C)	Measured Uniformity (°C)	Measured Stability (°C)	Overall Variation (°C)
20.0	20.0	20.0	0.32	0.27	0.67

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. : 68-400225-1

Page : 1 of 2

Submitted by : Tops-Lab Consultants Co.,Ltd.
189 Moo 3 Bangrakphatthana, Bangbuathong, Nonthaburi 11110

Equipment : Temperature controlled enclosure (Oven)
Manufacturer : Binder Model : FED 53
Range : N/A °C Resolution : 1 °C
Serial No. : 07-29050 ID No. : TLC-L004

Environment : On site calibration was carried out at the Laboratory, Tops-Lab Consultants Co.,Ltd.
Ambient Temperature : (32.0 to 34.0) °C
Relative Humidity : (45 to 50) %
Line Voltage : (220.0 to 228.0) V

Date of Received : 21 April 2025

Date of Calibration : 21 April 2025

Date of Issue : 23 April 2025

Calibrated by : [REDACTED]

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	67-400584-1	29 Apr 2025	National Institute of Metrology Thailand (NIMT)

The Uncertainties are for a confidence probability of approximately 95%

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Certificate of Calibration

Certificate No. : 68-400225-1

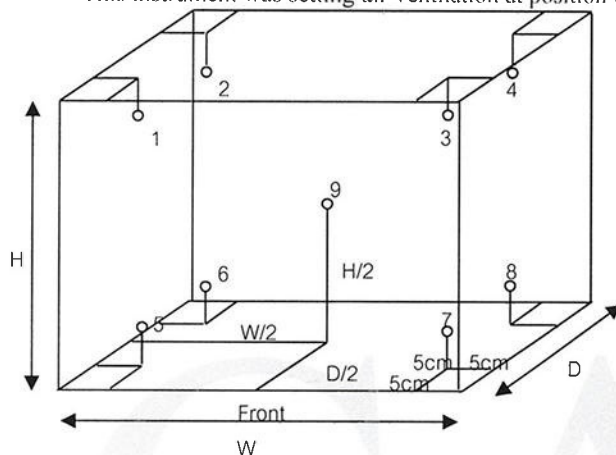
Page : 2 of 2

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 = 0.40 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	104	104	105.5	104.4	103.8	104.0	105.7	104.4	104.3	104.8	104.1	0.97
180	180	180	181.9	179.5	179.3	179.3	182.8	180.7	181.0	181.3	179.7	1.3

Test Point (°C)	Setting Temperature (°C)	Indicating Temperature (°C)	Measured Uniformity (°C)	Measured Stability (°C)	Overall Variation (°C)
104	104	104	1.7	0.1	2.2
180	180	180	3.5	0.3	3.9

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. : 68-400225-4

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Submitted by : Tops-Lab Consultants Co., Ltd.
189 Moo 3 Bangrakphatthana, Bangbuathong, Nonthaburi 11110

Equipment : Water Bath
Manufacturer : Memmert Model : WNB 14
Range : N/A °C Resolution : 0.1 °C
Serial No. : L410.1294 ID No. : TLC-L009

Environment : On site calibration was carried out at the Laboratory, Tops-Lab Consultants Co., Ltd.
Ambient Temperature : (32.0 to 34.0) °C
Relative Humidity : (45 to 50) %
Line Voltage : (220.0 to 228.0) V

Date of Received : 21 April 2025

Date of Calibration : 22 April 2025

Date of Issue : 23 April 2025

Calibrated by : [REDACTED]

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
400046 & 400024	68-400148-2	30 Sep 2025	National Institute of Metrology Thailand (NIMT)

The Uncertainties are for a confidence probability of approximately 95%

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Certificate of Calibration

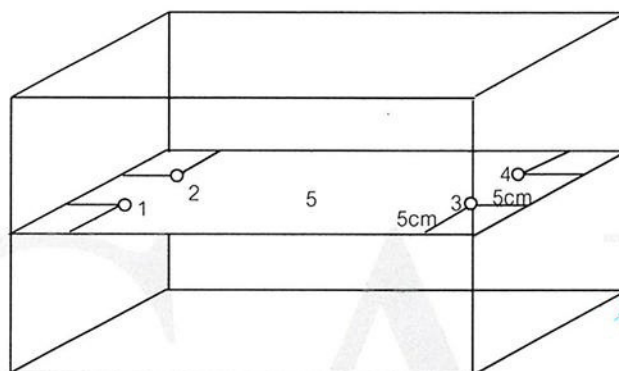
Certificate No. : 68-400225-4

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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	75.8	75.8	85.06	84.90	85.02	84.93	85.06	0.29	0.36	0.17
95.0	85.9	85.9	95.12	94.94	95.01	94.95	95.01	0.24	0.24	0.14

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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Certificate of Calibration

Certificate No. : 68-400225-1

Page : 1 of 2

Submitted by : Tops-Lab Consultants Co.,Ltd.
189 Moo 3 Bangrakphatthana, Bangbuathong, Nonthaburi 11110

Equipment : Temperature controlled enclosure (Oven)
Manufacturer : Binder Model : FED 53
Range : N/A °C Resolution : 1 °C
Serial No. : 07-29050 ID No. : TLC-L004

Environment : On site calibration was carried out at the Laboratory, Tops-Lab Consultants Co.,Ltd.
Ambient Temperature : (32.0 to 34.0) °C
Relative Humidity : (45 to 50) %
Line Voltage : (220.0 to 228.0) V

Date of Received : 21 April 2025

Date of Calibration : 21 April 2025

Date of Issue : 23 April 2025

Calibrated by : [REDACTED]

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	67-400584-1	29 Apr 2025	National Institute of Metrology Thailand (NIMT)

The Uncertainties are for a confidence probability of approximately 95%

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Certificate of Calibration

Certificate No. : 68-400225-1

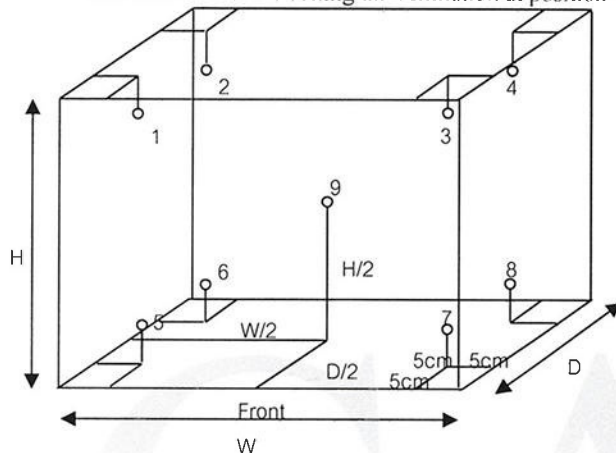
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Result of Calibration : Without Adjustment

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	104	104	105.5	104.4	103.8	104.0	105.7	104.4	104.3	104.8	104.1	0.97
180	180	180	181.9	179.5	179.3	179.3	182.8	180.7	181.0	181.3	179.7	1.3

Test Point (°C)	Setting Temperature (°C)	Indicating Temperature (°C)	Measured Uniformity (°C)	Measured Stability (°C)	Overall Variation (°C)
104	104	104	1.7	0.1	2.2
180	180	180	3.5	0.3	3.9

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. : 68-400225-8

Page : 1 of 2

Submitted by : Tops-Lab Consultants Co., Ltd.
189 Moo 3 Bangrakphatthana, Bangbuathong, Nonthaburi 11110

Equipment : Temperature controlled enclosure (Incubator)
Manufacturer : Memmert **Model :** IF55
Range : N/A °C **Resolution :** 0.1 °C
Serial No. : D215.1343 **ID No. :** TLC-L069

Environment : On site calibration was carried out at the Laboratory, Tops-Lab Consultants Co., Ltd.
Ambient Temperature : (24.0 to 25.0) °C
Relative Humidity : (45 to 50) %
Line Voltage : (220.0 to 228.0) V

Date of Received : 21 April 2025

Date of Calibration : 21 April 2025

Date of Issue : 23 April 2025

Calibrated by : [REDACTED]

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	68-400007-1	28 Jul 2025	National Institute of Metrology Thailand (NIMT)

The Uncertainties are for a confidence probability of approximately 95%

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Certificate of Calibration

Certificate No. : 68-400225-8

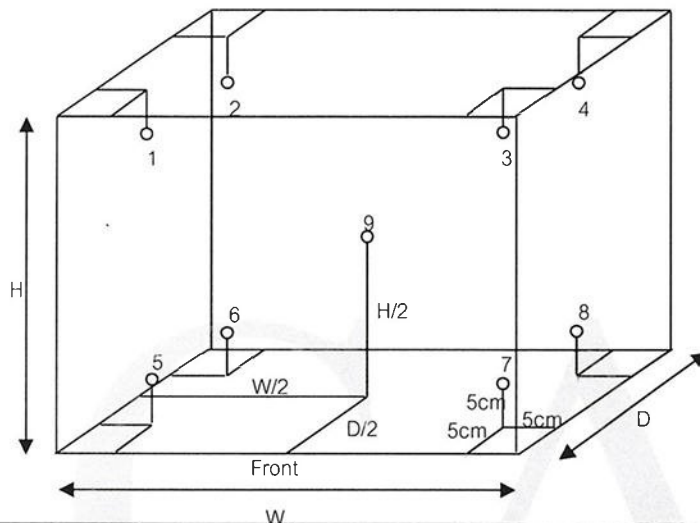
Page : 2 of 2

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 = 0.41 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	
35.0	35.0	35.0	34.94	35.00	35.02	34.99	35.03	34.99	34.82	34.97	34.96	0.30
44.5	44.5	44.5	44.59	44.63	44.64	44.62	44.65	44.58	44.40	44.62	44.58	0.30

Test Point (° C)	Setting Temperature (° C)	Indicating Temperature (° C)	Measured Uniformity (° C)	Measured Stability (° C)	Overall Variation (° C)
35.0	35.0	35.0	0.16	0.02	0.24
44.5	44.5	44.5	0.19	0.02	0.28

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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