

ภาคผนวก จ
เอกสารสอบเทียบเครื่องมือที่ใช้ในการตรวจวิเคราะห์

List of Instruments Certification for Water Quality Analysis

No.	Instrument/Equipment	Parameter	Manufacturer	Model/Serial No.	Calibrator	Certification No.	Date of Calibration	Due date of Calibration	Remark
1	pH Meter	pH	Horiba	LAQUA-PH210 HA9M0047	Technology Promotion Association (Thailand-Japan)	26CH231	25 Feb 26	26 Feb 27	-
2	Cooled Incubator	Escherichia coli	Binder	KB400 / WTB20200000015535	National Food Institute, Ministry of Industry, Thailand	2502229-006-01	19 Mar 25	18 Mar 26	-
3	Cooled Incubator	Total Coliform Bacteria Staphylococcus aureus	Binder	KB400 / WTB20200000015535	National Food Institute, Ministry of Industry, Thailand	2602303-006-01	11 Mar 26	10 Mar 27	-
4	Incubator	Total Coliform Bacteria	Binder	KB400 / 20220000022479	National Food Institute, Ministry of Industry, Thailand	2503682-004-01	1 Jul 25	30 Mar 26	-
5	Incubator	Escherichia coli	Binder	KB400 / 20220000000391	National Food Institute, Ministry of Industry, Thailand	2503287-002-01	5 Jun 25	4 Jun 26	-
6	Incubator	Pseudomonas aeruginosa	Memmert	IF75 / D317.0305	National Food Institute, Ministry of Industry, Thailand	2502229-004-01	20 Mar 25	19 Mar 26	-
7	Incubator		Memmert	IF75 / D317.0305	National Food Institute, Ministry of Industry, Thailand	2602303-004-01	11 Mar 26	10 Mar 27	-
8	Incubator		Memmert	IN75 / D317.0307	National Food Institute, Ministry of Industry, Thailand	2602303-005-01	11 Mar 26	10 Mar 27	-
9	Incubator	Staphylococcus aureus	Memmert	IPP260 / V615.0187	National Food Institute, Ministry of Industry, Thailand	2502229-001-01	19 Mar 25	18 Mar 26	-
10	Incubator	Legionella Sp.	Memmert	IPP260 / V615.0187	National Food Institute, Ministry of Industry, Thailand	2602303-001-01	11 Mar 26	10 Mar 27	-
11	Incubator		Binder	BD 53 E2 / 13-07343	National Food Institute, Ministry of Industry, Thailand	2504165-001-01	31 Jul 25	30 Jul 26	-



Certificate of Calibration

Cert.No.: 26CH231
Page.: 1 of 3

Equipment : pH Meter
Manufacturer : Horiba
Model : LAQUA-PH210
Serial No. : HA9M0047
ID No. : UAE.EFM.005/2563 (EFM,pH.05/63)
Condition As-Received: Used Item
Received Date : 24 February 2026
Calibration Date : 26 February 2026
Reference : 2602-0796WSO-2
Submitted by : United Analyst and Engineering Consultant Co.,Ltd.
3 Soi Udomsuk 41, Sukhumvit Road, Bangchak,
Phrakhanong, Bangkok 10260
Ambient Temperature : (25 ± 2.5) °C
Relative Humidity : (50 ± 15) %
Calibration Procedure : In - house method :
- CP-CH5 by direct measurement with DC voltage
standard and direct measurement with
certified reference material (CRM)
- CP-CH8 by comparison with temperature standard
Calibrated by : 
Approved by : 
() Chakrit Waewwanjua
() Ponpan Palpim
(✓) Saithip Meangmai
Issue Date : 27 February 2026

Condition of this calibration result

1. Reference Standard Instrument

Instrument	Serial No.	ID No.	Cert. No.	Due Date
1) Document Process Calibrator	54030049	130RC116	25E2743	25 Aug 2026
2) Ref. Standard Thermometer	4962054	110RC044	25I706	03 July 2026

- This measurement result is traceable to SI through Technology Promotion Association (Thailand - Japan)

2. Certified Reference Materials :The measurement results are traceable to SI through Hach Lenge GmbH Ltd.,
Deutsche Akkreditierungsstelle, Accredited No.D-RM-15184-01-00
:The measurement results are traceable to SI through CPA chem Ltd.,
ANSI-ASQ National Accreditation Board, Accredited No. AR-1835

Buffer Solution	Manufacturer	Lot No.	Exp. date
pH 4.008	CPA chem	1187328	18 Jan 2028
pH 7.000	Hach Lenge GmbH	C03319	17 Oct 2027
pH 10.010	CPA chem	1187332	18 Jan 2027

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)(7,10)

Unit Under Calibration	Nominal Value	Standard Voltage Input	Actual Reading		Uncertainty of Measurement (mV)	Coverage factor k
			mV	pH		
pH Meter S/N.: HA9M0047	4.00	177.48	177.3	4.01	0.058	2.00
	7.00	0.00	0.0	7.02	0.058	2.00
	7.00	0.00	0.0	7.02	0.058	2.00
	10.00	-177.48	-177.2	10.01	0.058	2.00

The Uncertainties are for a confidence probability of approximately 95%

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

Cert.No.: 26CH231
Page.: 3 of 3

Calibration Results

Function : pH Measurement

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

Unit Under Calibration	Standard pH Buffer Solution	Actual pH Reading	Actual mV Reading (mV)	Uncertainty of pH Measurement (±)	Coverage factor k
pH Electrode S/N.: -	4.008	4.01	161.1	0.0079	2.00
	7.000	7.00	-10.4	0.0096	2.00
	7.000	7.00	-9.9	0.0095	2.00
	10.010	10.02	-177.9	0.0095	2.00

Function : Temperature Measurement

(*) Without adjustment

This equipment was connected with Temperature Probe;

- Model : -
- Serial No. : -

Dimension of probe

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

Calibration Point (°C)	Standard Temperature (°C)	UUC* Reading (°C)	Error (°C)	Uncertainty of measurement (± °C)	Coverage factor k
15.0	15.001	15.0	-0.001	0.13	2.00
30.0	30.001	30.0	-0.001	0.13	2.00
45.0	45.001	44.9	-0.101	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 %.

Calibration Certificate

Certificate No.: 2502229-006-01
Client name: UNITED ANALYST AND ENGINEERING CONSULTANT CO.,LTD.
Address: 3 Sol Udomsuk 41, Sukhumvit Road,
 Bangchack, Prakhonong, Bangkok 10260

Page 1 of 3

Equipment: CHAMBER (Incubator)
Manufacturer: BINDER
Model: KB 400
Serial No.: 2020000015535
ID No.: UAE.MIC.016/2564
Order No.: 2502229
Operation No.: 2502229-006
Date of Receipt: 19 March 2025
Date of Calibration: 19 March 2025

Calibrated by Mr.Jerawut Prapawuttipong **Approved by** [Redacted]
Scientist
Manager, Division of Calibration Laboratory
Date of Issue: 25 March 2025 **Responsible for the Technical Management Team**

The uncertainties are for a confidence probability of approximately 95 %.
 This Certificate is issued in accordance with the conditions of accreditation granted by the Thai Laboratory Accreditation scheme which has assessed the measurement capability of the laboratory and its traceability to recognized national standards and to the units of measurement realized at the corresponding national standards laboratory. This certificate may not be reproduced other than in full except with the prior written approval of the National Food Institute.

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

Calibration Report

Certificate No.: 2502229-006-01
Equipment: CHAMBER (Incubator)
Model: KB 400 **Serial No.:** 2020000015535
Resolution: 0.1 °C **ID No.:** UAE.MIC.016/2564
Manufacturer: BINDER
Date of Calibration: 19 March 2025

Page 2 of 3

Location: LABORATORY, UNITED ANALYST AND ENGINEERING CONSULTANT CO.,LTD.
Environment Condition: Ambient Temperature (18 ± 1) °C
 Relative Humidity (50 ± 5) %
 Line Voltage (223 ± 3) Volt

Condition of this results of Calibration:

- This instrument was calibrated by insert 13 standard thermometer into its chamber and calibration according to W-TE-014 Based on TLAS G-20-1/02-08 (E): Guidelines for Calibration and Checks of Temperature Controlled Enclosures.
- The temperature scale used was based on ITS - 90.
- All data show below were final values and the final data may be obtained upon request.

2. Reference Standard Instrument :

Instrument	Model	Serial No./ID No.	Certificate No.	Due Date	Through
Digital Thermometer with sensor	34972A	MY49016851	TE 670477-01	4 May 2025	NATIONAL FOOD INSTITUTE
	RTD	CHP201: 303 / RTD#201: 303			

- This certificate is traceable to International System of Units (SI Units).
- This certificate was certified only for the instrument we calibrated.
- This result of calibration was found accurate as shown on date and place of calibration only.
- Condition of Calibrated item : Good

UUC Description :

Time of Record 1 Hour 9 Minute At 35.0 °C
 Fresh air Damper 1 Open Position 1 Close Fan 1 Not Available

- Result of Calibration : ☒ Without adjustment ☐ After adjustment

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

Calibration Report

Certificate No.: 2502229-006-01
Equipment: CHAMBER (Incubator)
Model: KB 400 **Serial No.:** 2020000015535
Resolution: 0.1 °C **ID No.:** UAE.MIC.016/2564
Manufacturer: BINDER
Date of Calibration: 19 March 2025

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Calibration point: 35.0 °C

Calibration Condition	Temperature (°C)	Relative Humidity (%)	Line Voltage (Volt)
MIN	17.1	45	220.0
MAX	19.1	55	225.0

Table 1 : Reporting of Temperature

Calibration point (°C)	Measured Temperature (°C) @ Sensor No. (Sensor No.13 is REF)													Uncertainty ± (°C)
35.0	#1	#2	#3	#4	#5	#6	#7	#8	#9	#10	#11	#12	#13	
	34.98	35.17	34.99	34.92	35.18	35.01	35.00	35.13	35.00	34.96	35.02	35.17	35.04	0.27

Table 2 : Reporting of Characterization Result

UUC* Setting (°C)	UUC* Reading (°C)			Temperature Stability ± (°C)	Temperature Uniformity (°C)	Overall Variation (°C)
35.0	MIN	MAX	Average			
	35.0	35.0	35.0	0.029	0.15	0.30

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

UUC* = Unit Under Calibration

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

Uniformity = The maximum difference of measured temperatures at any sensors and the measured temperature at the reference location which are observed at the same time.

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

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

----- End -----

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

Calibration Certificate

Certificate No.: 2602303-006-01
Page : 1 of 2

Equipment: CHAMBER (Incubator)
Manufacturer: BINDER
Model: KB 400
Serial No.: 2020000015535
ID No.: UAE MIC 018/2564
Order No.: 2602303
Operation No.: 2602303-006
Date of Receipt: 11 March 2026
Date of Calibration: 11 March 2026

Customer Name: UNITED ANALYST AND ENGINEERING CONSULTANT CO. LTD
Address: 3 Soi Udomsak 41, Sukhumvit Road,
Bangchack, Prakhong, Bangkok 10260

Metrological traceability:

1. Calibration Method:
- This instrument was calibrated by inserting 9 standard thermometers into its chamber, in accordance with W-T-E-014, based on TIAS G-20-102-08 (E). Guidelines for Calibration and Checks of Temperature Controlled Enclosures.
 - The temperature scale used in this laboratory is the International Temperature Scale of 1990 (ITS-90).
 - All data shown below are final values, and the initial data may be obtained upon request.
2. Reference Standard Instrument:
- Instrument: Digital Thermometer with sensor
Model/Type: DAQ973A
Serial No./ID No.: MY5908964
Certificate No.: 2502244-001-01
Due Date: 29 March 2026
Through: NATIONAL FOOD INSTITUTE
3. This certificate is traceable to the International System of Units (SI).
4. This certificate is valid only for the instrument that was calibrated.
5. The result of this calibration was found to be accurate only on the date and at the place of calibration shown.

2. Reference Standard Instrument:

Instrument: Digital Thermometer with sensor
Model/Type: DAQ973A
Serial No./ID No.: MY5908964
Certificate No.: 2502244-001-01
Due Date: 29 March 2026
Through: NATIONAL FOOD INSTITUTE

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

4. This certificate is valid only for the instrument that was calibrated.

5. The result of this calibration was found to be accurate only on the date and at the place of calibration shown.

Calibrated by: Mr. Nuttapol Niyomchat Specialist

Date of Issue: 19 March 2026

Approved by: [Signature]

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

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

Calibration Certificate

Certificate No.: 2602303-006-01
Page : 2 of 2

Calibration Condition:

Equipment: CHAMBER (Incubator)
UUC Resolution: 0.1 °C
Condition of the item: Normal & Good
Without adjustment / As Found
- Time of record: 1 hour 9 minute / point

Place of Calibration: Microbiology Laboratory
UNITED ANALYST AND ENGINEERING CONSULTANT CO. LTD
Environment Conditions: Ambient Temperature (17.2 ± 1) °C
Relative Humidity (51.5 ± 4) %
Line Voltage (229 ± 2) V.

Calibration Results:

Table 1 : Reporting of Temperature

Calibration Point (°C)	Measured Temperature (°C) @ Sensor No. (Sensor No. 9 is REF)										Measurement Uncertainty (±°C)
	Std.#1	Std.#2	Std.#3	Std.#4	Std.#5	Std.#6	Std.#7	Std.#8	Std.#9	Std.#10	
35.0	34.78	34.86	34.81	34.83	35.22	35.21	35.22	35.12	34.83	34.83	0.28

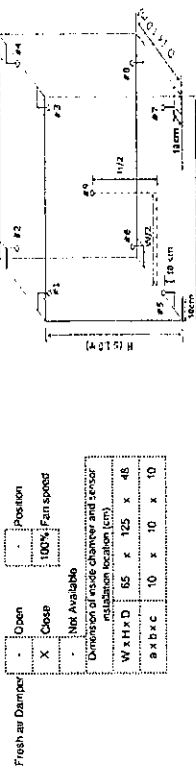
Table 2 : Reporting of Characterization Results

UUC* Setting (°C)	UUC* Reading (°C)			Stability ± (°C)	Uniformity (°C)	Overall Variation (°C)
	Max	Min	Average			
35.0	35.0	35.0	35.0	0.034	0.39	0.52

Note

- UUC* : Unit Under Calibration
- The quoted uncertainty includes contributions from 'Stability' and 'Loading Effect' (20% of Temperature Uniformity).
- Stability = One-half of the greatest maximum difference of measured temperatures at any one sensors, for at least half an hour after reaching steady state.
- Uniformity = The maximum difference of measured temperatures at any sensors and the measured temperature at the reference location which are observed at the same time.
- Overall Variation = The difference of The maximum and minimum measured temperatures throughout observation time.

For more information, details of the sensor installation should be reported



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

----- End of Report -----

Calibration Certificate

Certificate No.: 2503682-004-01
Client name: UNITED ANALYST AND ENGINEERING CONSULTANT CO.,LTD.
Address: 3 Soi Udomsuk 41, Sukhumvit Road,
Bangchack, Prakhonong, Bangkok 10260

Page 1 of 3

Equipment: CHAMBER (Incubator)
Manufacturer: BINDER
Model: KB 400
Serial No.: 20220000022479
ID No.: UAE.MIC.028/2566
Order No.: 2503682
Operation No.: 2503682-004
Date of Receipt: 1 July 2025
Date of Calibration: 1 July 2025

Calibrated by Mr. Pheraphat Tuanjit
Scientist
Approved [Signature]
Vice President, Department of Laboratory Services
Responsible for the Technical Management Team
Date of Issue: 3 July 2025

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

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

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



Calibration Report

Certificate No.: 2503682-004-01
Equipment: CHAMBER (Incubator)
Model: KB 400 Serial No.: 20220000022479
Resolution: 0.1 °C ID No.: UAE.MIC.028/2566
Manufacturer: BINDER
Date of Calibration: 1 July 2025

Page 2 of 3

Location: Microbiology Laboratory, UNITED ANALYST AND ENGINEERING CONSULTANT CO.,LTD.
Environment Condition: Ambient Temperature (21 ± 1) °C
Relative Humidity (55 ± 10) %
Line Voltage (230 ± 5) Volt

Condition of this results of Calibration:

- This instrument was calibrated by insert 13 standard thermometer into its chamber and calibration according to W-TE-014 Based on TLAS G-20-1/02-08 (E): Guidelines for Calibration and Checks of Temperature Controlled Enclosures.
 - The temperature scale used was based on ITS - 90.
 - All data show below were final values and the initial data may be obtained upon request.
- Reference Standard Instrument:

Instrument	Model	Serial No./ID No.	Certificate No.	Due Date	Through
Digital Thermometer with sensor	34972A	MY59003377	2501168-001-01	13 January 2026	NATIONAL FOOD INSTITUTE
	RTD	CH-101-201 / RTD-101-201			

- This certificate is traceable to International System of Units (SI Units).
- This certificate was certified only for the instrument we calibrated.
- This result of calibration was found accurate as shown on date and place of calibration only.
- Condition of Calibrated item: Good

UUC Description:

Time of Record 1 Hour 9 Minute At 35.0 °C
Fresh air Damper - Open Position -
X Close Fan 100%
- Not Available

- Result of Calibration: X Without adjustment After adjustment

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



Calibration Report

Certificate No.: 2503682-004-01
Equipment: CHAMBER (Incubator)
Model: KB 400 Serial No.: 20220000022479
Resolution: 0.1 °C ID No.: UAE.MIC.028/2566
Manufacturer: BINDER
Date of Calibration: 1 July 2025

Page 3 of 3

Calibration point: 35.0 °C

Calibration result:

Calibration Condition	Temperature (°C)	Relative Humidity (%)	Line Voltage (Volt)
MIN	20.1	45	225.0
MAX	22.0	65	235.0

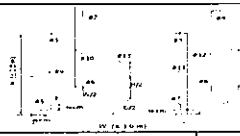


Table 1 : Reporting of Temperature

Calibration point (°C)	Measured Temperature (°C) @ Sensor No. (Sensor No.13 is REF)													Uncertainty ± (°C)
	#1	#2	#3	#4	#5	#6	#7	#8	#9	#10	#11	#12	#13	
35.0	35.19	35.03	34.83	35.21	34.96	34.94	34.84	34.84	35.06	34.94	35.15	34.79	34.92	0.27

Table 2 : Reporting of Characterization Result

UUC* Setting (°C)	UUC* Reading (°C)			Temperature Stability ± (°C)	Temperature Uniformity (°C)	Overall Variation (°C)
	MIN	MAX	Average			
34.8	34.8	34.8	34.8	0.040	0.29	0.50

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

UUC* = Unit Under Calibration

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

Uniformity = The maximum difference of measured temperatures at any sensors and the measured temperature at the reference location which are observed at the same time.

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

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

***** End *****

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



Calibration Certificate

Certificate No.: 2503287-002-01
Client name: UNITED ANALYST AND ENGINEERING CONSULTANT CO., LTD.
Address: 3 Soi Udomsuk 41, Sukhumvit Road,
Bangchack, Prakhong, Bangkok 10260

Page 1 of 3

Equipment: CHAMBER (Incubator)
Manufacturer: BINDER
Model: KB 400
Serial No.: 20220000000391
ID No.: UAE.MIC.029/2565
Order No.: 2503287
Operation No.: 2503287-002
Date of Receipt: 5 June 2025
Date of Calibration: 5 June 2025

Calibrated by Mr. Phraphat Tuanjit
Scientist
Approved [Signature]
Vice President, Department of Laboratory Services
Responsible for the Technical Management Team
Date of Issue: 11 June 2025

The uncertainties are for a confidence probability of approximately 95 %.
This Certificate is issued in accordance with the conditions of accreditation granted by the Thai Laboratory Accreditation scheme which has assessed the measurement capability of the laboratory and its traceability to recognized national standards and to the units of measurement realized at the corresponding national standards laboratory. This certificate may not be reproduced other than in full except with the prior written approval of the National Food Institute.

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



Calibration Report

Certificate No.: 2503287-002-01
Equipment: CHAMBER (Incubator)
Model: KB 400 **Serial No.:** 20220000000391
Resolution: 0.1 °C **ID No.:** UAE.MIC.029/2565
Manufacturer: BINDER

Date of Calibration: 5 June 2025

Page 2 of 3

Location: Room 302 Microbiology Laboratory, UNITED ANALYST AND ENGINEERING CONSULTANT CO., LTD.
Environment Condition: Ambient Temperature (18 ± 1) °C
Relative Humidity (53 ± 6) %
Line Voltage (230 ± 5) Volt

Condition of this results of Calibration:

- This instrument was calibrated by insert 13 standard thermometer into its chamber and calibration according to W-TE-014 Based on TLAS G-20-1/02-08 (E) Guidelines for Calibration and Checks of Temperature Controlled Enclosures.
- The temperature scale used was based on ITS - 90.
- All data show below were final values and the initial data may be obtained upon request.

2. Reference Standard Instrument :

Instrument	Model	Serial No./ID No.	Certificate No.	Due Date	Through
Digital Thermometer with sensor	34972A	MY59003377	2501168-001-01	13 January 2026	NATIONAL FOOD INSTITUTE
	RTD	CH101-202 / RTD101 203			

- This certificate is traceable to International System of Units (SI Units).
- This certificate was certified only for the instrument we calibrated.
- This result of calibration was found accurate as shown on date and place of calibration only.
- Condition of Calibrated item : Good

UUC Description :

Time of Record 1 Hour 9 Minute At 35.0 °C
Fresh air Damper - Open Position -
- X Close Fan 100%
- Not Available

- Result of Calibration : ☒ Without adjustment ☐ After adjustment

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



Calibration Report

Certificate No.: 2503287-002-01
Equipment: CHAMBER (Incubator)
Model: KB 400 **Serial No.:** 20220000000391
Resolution: 0.1 °C **ID No.:** UAE.MIC.029/2565
Manufacturer: BINDER

Date of Calibration: 5 June 2025

Page 3 of 3

Calibration point: 35.0 °C

Calibration result:

Calibration Condition	Temperature (°C)	Relative Humidity (%)	Line Voltage (Volts)
MIN	17.4	48	225.0
MAX	18.5	59	235.0

Table1 : Reporting of Temperature

Calibration point (°C)	Measured Temperature (°C) @ Sensor No. (Sensor No.13 is REF)													Uncertainty ± (°C)
35.0	#1	#2	#3	#4	#5	#6	#7	#8	#9	#10	#11	#12	#13	
	35.08	35.11	35.01	35.13	35.17	35.09	34.98	34.89	35.15	35.05	35.06	34.89	35.06	0.27

Table 2 : Reporting of Characterization Result

UUC* Setting (°C)	UUC* Reading (°C)			Temperature Stability ± (°C)	Temperature Uniformity (°C)	Overall Variation (°C)
	MIN	MAX	Average			
35.0	35.0	35.1	35.0	0.038	0.17	0.34

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

UUC* = Unit Under Calibration

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

Uniformity = The maximum difference of measured temperatures at any sensors and the measured temperature at the reference location which are observed at the same time.

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

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

----- End -----

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



Calibration Certificate

Certificate No.: 2502229-004-01
Client name: UNITED ANALYST AND ENGINEERING CONSULTANT CO.,LTD.
Address: 3 Sol Udomsuk 41, Sukhumvit Road,
Bangchack, Prakhonong, Bangkok 10260

Page 1 of 3

Equipment: CHAMBER (Incubator)
Manufacturer: MEMMERT
Model: IN75
Serial No.: D317.0305
ID No.: UAE.MIC.022/2561
Order No.: 2502229
Operation No.: 2502229-004
Date of Receipt: 19 March 2025
Date of Calibration: 20 March 2025

Calibrated by: Mr.Yothin Charoensuk
Scientist
Approved by: [Signature]
Manager, Division of Calibration Laboratory
Responsible for the Technical Management Team
Date of Issue: 25 March 2025

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

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

ICS-009 Revision: 01 Date: 20-04-65

Calibration Report

Certificate No.: 2502229-004-01
Equipment: CHAMBER (Incubator)
Model: IN75
Resolution: 0.1 °C
Manufacturer: MEMMERT
Serial No.: D317.0305
ID No.: UAE.MIC.022/2561

Date of Calibration: 20 March 2025

Page 2 of 3

Location: 302, UNITED ANALYST AND ENGINEERING CONSULTANT CO.,LTD.
Environment Condition: Ambient Temperature (28.6 ± 1) °C
Relative Humidity (59 ± 1) %
Line Voltage (223 ± 3) Volt

Condition of this results of Calibration:

- This instrument was calibrated by insert 9 standard thermometer into its chamber and calibration according to W-TE-014 Based on TLAS G-70-1/02-08 (E): Guidelines for Calibration and Checks of Temperature Controlled Enclosures.
- The temperature scale used was based on ITS - 90.
- All data show below were final values and the initial data may be obtained upon request.

2. Reference Standard Instrument :

Instrument	Model	Serial No./ID No.	Certificate No.	Due Date	Through
Digital Thermometer with sensor	34972A	MY57003168	TE 670486-01	8 June 2025	NATIONAL FOOD INSTITUTE
	RTD	One101-109/ RTD#101-109			

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

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

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

6. Condition of Calibrated item : Good

UUC Description :

Time of Record : 1 Hour 9 Minute At 41.5 °C
Fresh air Damper : ☒ Open Position ☒ Fan 100%
☒ Close ☒ Not Available

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

ICS-012 Revision: 01 Date: 20-04-65

Calibration Report

Certificate No.: 2502229-004-01
Equipment: CHAMBER (Incubator)
Model: IN75
Resolution: 0.1 °C
Manufacturer: MEMMERT
Serial No.: D317.0305
ID No.: UAE.MIC.022/2561

Date of Calibration: 20 March 2025

Page 3 of 3

Calibration point: 41.5 °C

Calibration result:

Calibration Condition	Temperature (°C)	Relative Humidity (%)	Line Voltage (Volt)
MIN	28.6	58	220.0
MAX	28.9	60	225.0

Table 1 : Reporting of Temperature

Calibration point (°C)	Measured Temperature (°C) @ Sensor No. (Sensor No.9 is REF)									Uncertainty ± (°C)
	# 1	# 2	# 3	# 4	# 5	# 6	# 7	# 8	# 9	
41.5	41.50	41.39	41.45	41.40	41.69	41.35	41.29	41.32	41.34	0.27

Table 2 : Reporting of Characterization Result

UUC* Setting (°C)	UUC* Reading (°C)			Stability ± (°C)	Uniformity (°C)	Overall Variation (°C)
	MIN	MAX	Average			
41.5	41.5	41.5	41.5	0.023	0.34	0.44

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

UUC* = Unit Under Calibration

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

Uniformity = The maximum difference of measured temperatures at any sensors and the measured temperature at the reference location which are observed at the same time.

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

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

***** End *****

ICS-012 Revision: 01 Date: 20-04-65

Calibration Certificate

Certificate No.: 2602303-004-01

Page : 1 of 2

Manufacturers

Model: F75

Serial No.: D317 0305

ID No.: UAE MIC 02:

Order No. : 2672303

11

Operation No.: 2006-0827092

Date of Receipt: 11 March 2011

Date of Calibration

Methodological considerations

1. Calibration Method:

- This instrument was calibrated by inserting 9 standard thermometers into its chamber, in accordance with W-TE-014.

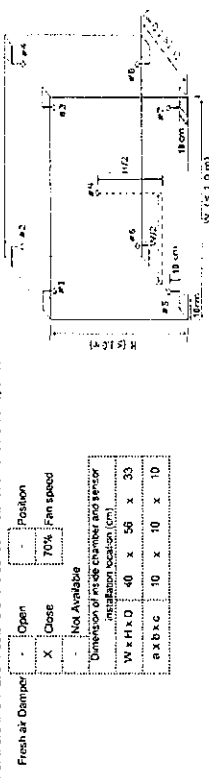
- All data shown below are final

Instrument	Model/Type	Serial No./ID No.	Certificate No.	Due Date	Through
Digital Thermometer with	34872A	MY59003377			NATIONAL FOOD

polynomial over $\mathbb{C}[x]$ is irreducible. This is

ה"ר זלמן לייבוויטש (ה'תר"ל - ה'תש"ח) זצ"ל

5 The result of this calibration was found to be accurate only on the date and at the place of calibration shown



This Certificate is issued in accordance with the conditions of accreditation granted by the Thai Laboratory Accreditation scheme which has assessed the measurement capability of the laboratory and is traceable to recognized national standards and to the units of measurement realized at the corresponding national standards laboratory. This certificate may not be reproduced other than in full accord with this text without approval of the National Food Institute.

-----End of Report-----





Calibration Certificate

Certificate No.: 2602303-005-01
Page : 2 of 2

Calibration Condition:

Equipment:	CHAMBER (Incubator)	Place of Calibration:	Microbiology Laboratory (302)
UUC* Resolution:	0.1 °C	Environment Conditions:	Ambient Temperature (23.5 ± 1) °C Relative Humidity (59.1 ± 3) % Line Voltage (223 ± 3) V
Condition of the Item:	Normal & Good		
	Without adjustment / As Found		
	- Time of record 1 hour 9 minute / point		

Calibration Results:

Table 1 : Reporting of Temperature

Calibration Point (°C)	Std.#1	Std.#2	Std.#3	Std.#4	Std.#5	Std.#6	Std.#7	Std.#8	Std.#9	Measurement Uncertainty (±°C)
41.5	41.84	41.85	41.80	41.76	40.96	41.18	41.12	41.32	41.33	0.29

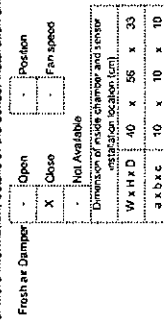
Table 2 : Reporting of Characterization Results

UUC* Setting (°C)	Max	Min	Average	Stability ± (°C)	Uniformity (°C)	Overall Variation (°C)
41.5	41.5	41.5	41.5	0.06	0.52	0.96

Note

- UUC* : Unit Under Calibration
- The quoted uncertainty includes contributions from 'Stability' and 'Loading Effect (20% of Temperature Uniformity)'.
- Stability = One-half of the greatest maximum difference of measured temperatures at any one sensors, for at least half an hour after reaching steady state.
- Uniformity = The maximum difference of measured temperatures at any sensors and the measured temperature at the reference location which are observed at the same time.
- Overall Variation = The difference of The maximum and minimum measured temperatures throughout observation time.

For more information, details of the sensor installation should be reported.



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

----- End of Report -----



Calibration Certificate

Certificate No.: 2602303-005-01
Page : 1 of 2

Equipment: CHAMBER (Incubator)

Manufacturer: NEMWERT

Model: INT5

Serial No.: D317 0307

ID No.: UNE-MIC-0232561

Order No.: 2602303

Operation No.: 2602303-005

Date of Receipt: 11 March 2026

Date of Calibration: 11 March 2026

Customer Name: UNITED ANALYST AND ENGINEERING CONSULTANT CO., LTD

Address: 3 Soi Udornasuk 41, Sukhumvit Road,

Bangchack, Prathanong, Bangkok 10260

Metrological traceability:

1. Calibration Method:

- This instrument was calibrated by inserting 9 standard thermometers into its chamber, in accordance with W-TE-014, based on TLAS G-20-1002-08 (E). Guidelines for Calibration and Checks of Temperature Controlled Enclosures.
- The temperature scale used in this laboratory is the International Temperature Scale of 1990 (ITS-90).

- All data shown below are final values, and the initial data may be obtained upon request.

2. Reference Standard Instrument:

Instrument	Model/Type	Serial No./ID No.	Certificate No.	Due Date	Through
Digital Thermometer with sensor	34972A RTD	MY59003377 CH201-200/RTD201-200	2601300-001-01	10 January 2027	NATIONAL FOOD INSTITUTE

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

- 4. This certificate is valid only for the instrument that was calibrated.
- 5. The result of this calibration was found to be accurate only on the date and at the place of calibration shown.

Calibrated by

Mr. Manas Somsak
Specialist

Approved by

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

18 March 2026

Date of Issue:

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



Calibration Certificate

Certificate No.: 2502229-001-01
Client name: UNITED ANALYST AND ENGINEERING CONSULTANT CO.,LTD.
Address: 3 Soi Udomsuk 41, Sukhumvit Road,
 Bangchack, Prakhonong, Bangkok 10260

Page 1 of 3

Equipment: CHAMBER (Incubator)
Manufacturer: MEMMERT
Model: IPP 260
Serial No.: V615.0187
ID No.: UAE.MIC.003/2559
Order No.: 2502229
Operation No.: 2502229-001
Date of Receipt: 19 March 2025
Date of Calibration: 19 March 2025

Calibrated by Mr.Jerawut Prapawuttipong
 Scientist

Approved by

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

Date of Issue: 25 March 2025

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

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

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



Calibration Report

Certificate No.: 2502229-001-01
Equipment: CHAMBER (Incubator)
 Model: IPP 260 Serial No.: V615.0187
 Resolution: 0.1 °C ID No.: UAE.MIC.003/2559
 Manufacturer: MEMMERT

Date of Calibration: 19 March 2025

Page 2 of 3

Location: LABORATORY, UNITED ANALYST AND ENGINEERING CONSULTANT CO.,LTD.
Environment Condition:
 Ambient Temperature (16.2 ± 1) °C
 Relative Humidity (32 ± 4) %
 Line Voltage (223 ± 3) Volt

Condition of this results of Calibration:

- This instrument was calibrated by insert 9 standard thermometer into its chamber and calibration according to W-TE-014 Based on TLAS G-20-1/02-08 (E): Guidelines for Calibration and Checks of Temperature Controlled Enclosures.
 - The temperature scale used was based on ITS - 90.
 - All data show below were final values and the initial data may be obtained upon request.

2. Reference Standard Instrument :

Instrument	Model	Serial No./ID No.	Certificate No.	Due Date	Through
Digital Thermometer with sensor	34972A	MY49016851	TE 670477-01	4 May 2025	NATIONAL FOOD INSTITUTE
	RTD	OM101-109/ RTD#101-109			

- This certificate is traceable to International System of Units (SI Units).
- This certificate was certified only for the instrument we calibrated.
- This result of calibration was found accurate as shown on date and place of calibration only.
- Condition of Calibrated item : Good

UUC Description :

Time of Record 1 Hour 9 Minute At 35.0 °C
 Fresh air Damper - Open Position -
 - X Close Fan -
 - Not Available

- Result of Calibration : ☒ Without adjustment ☐ After adjustment

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



Calibration Report

Certificate No.: 2502229-001-01
Equipment: CHAMBER (Incubator)
 Model: IPP 260 Serial No.: V615.0187
 Resolution: 0.1 °C ID No.: UAE.MIC.003/2559
 Manufacturer: MEMMERT

Date of Calibration: 19 March 2025

Page 3 of 3

Calibration point: 35.0 °C

Calibration result:

Calibration Condition	Temperature (°C)	Relative Humidity (%)	Line Voltage (Volt)
MIN	15.5	28	220.0
MAX	17.1	35	225.0

Table1 : Reporting of Temperature

Calibration point (°C)	Measured Temperature (°C) @ Sensor No. (Sensor No.9 is REF)									Uncertainty ± (°C)
	# 1	# 2	# 3	# 4	# 5	# 6	# 7	# 8	# 9	
35.0	34.94	34.95	34.91	34.93	35.15	35.01	34.98	35.05	35.12	0.29

Table 2 : Reporting of Characterization Result

UUC* Setting (°C)	UUC* Reading (°C)			Stability ± (°C)	Uniformity (°C)	Overall Variation (°C)
	MIN	MAX	Average			
35.0	35.0	35.0	35.0	0.10	0.21	0.35

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

UUC* = Unit Under Calibration

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

Uniformity = The maximum difference of measured temperatures at any sensors and the measured temperature at the reference location which are observed at the same time.

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

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

----- End -----

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



Calibration Certificate

Certificate No.: 2602303-001-01
Page : 2 of 2

Calibration Condition:

Equipment:	CHAMBER (Incubator)	Place of Calibration:	Microbiology Laboratory
UUC* Resolution:	0.1 °C		UNITED ANALYST AND ENGINEERING CONSULTANT CO. LTD
Condition of the item:	Normal & Good	Environment Conditions:	Ambient Temperature (17.2 ± 1) °C
	Without adjustment / As Found	Relative Humidity	(51.5 ± 4.1) %
		Line Voltage	(229 ± 2) V.
		Time of record	1 hour 9 minute / point

Calibration Results:

Table 1 : Reporting of Temperature

Calibration Point (°C)	Measured Temperature (°C) @ Sensor No. (Sensor No.9 is REF)										Measurement Uncertainty (±°C)
	Sid.#1	Sid.#2	Sid.#3	Sid.#4	Sid.#5	Sid.#6	Sid.#7	Sid.#8	Sid.#9		
35.0	35.01	34.94	35.20	35.15	35.26	34.99	34.79	34.83	35.02	0.28	

Table 2 : Reporting of Characterization Results

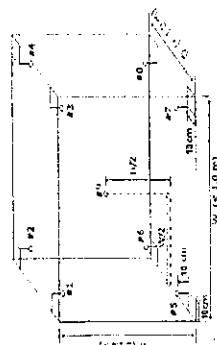
UUC* Setting (°C)	UUC* Reading (°C)			Stability ± (°C)	Uniformity (°C)	Overall Variation (°C)
	Max	Min	Average			
35.0	35.0	35.0	35.0	0.069	0.24	0.53

Note

- UUC* : Unit Under Calibration
- The quoted uncertainty includes contributions from 'Stability and Loading Effect (20% of Temperature Uniformity).
- Stability = One-half of the greatest maximum difference of measured temperatures at any one sensor, for at least half an hour after reaching steady state
- Uniformity = The maximum difference of measured temperatures at any sensor and the measured temperature at the reference location which are observed at the same time
- Overall Variation = The difference of The maximum and minimum measured temperatures throughout observation time.

For more information, details of the sensor installation should be reported

Fresh air Damp:	X	Open	X	Close	100% Fan speed
					Not Available
					Dimension of inside chamber and sensor installation location (cm)
					W x H x D 64 x 20 x 50
					a x b x c 10 x 10 x 10



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

End of Report



Calibration Certificate

Certificate No.: 2602303-001-01
Page : 1 of 2

Equipment:

CHAMBER (Incubator)

MEMMERT

Model:

IPP260

Serial No.:

V615 0187

ID No.:

UAE MIC.00392559

Order No.:

2602303

Operation No.:

2602303-001

Date of Receipt:

11 March 2026

Date of Calibration:

11 March 2026

Customer Name: UNITED ANALYST AND ENGINEERING CONSULTANT CO. LTD

Address: 3 Soi Udomsak 41, Sukhumvit Road,

Bangchack, Prachanong, Bangkok 10260

Metrological traceability:

1. Calibration Method:

- This instrument was calibrated by inserting 9 standard thermometers into its chamber, in accordance with W.TE-014, based on TLAS G-20-1102-08 (E): Guidelines for Calibration and Checks of Temperature Controlled Enclosures.
- The temperature scale used in this laboratory is the International Temperature Scale of 1990 (ITS-90).
- All data shown below are final values, and the initial data may be obtained upon request.

2. Reference Standard Instrument:

Instrument	Model/Type	Serial No./ID No.	Certificate No.	Due Date
Original Thermometer with sensor	DAO973A RTD	MY59008964 CH101-106/RTD101-106	2502244-001-01	29 March 2026
				Through NATIONAL FOOD INSTITUTE

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

4. This certificate is valid only for the instrument that was calibrated.

5. The result of this calibration was found to be accurate only on the date and at the place of calibration shown.

Calibrated by

Mr.Nuttapol Niyomchat

Approved by

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

19 March 2026

Date of Issue:

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



Calibration Certificate

Certificate No.: 2504165-001-01
Client name: UNITED ANALYST AND ENGINEERING CONSULTANT CO.,LTD.
Address: 3 Sol Udomsuk 41, Sukhumvit Road,
Bangchack, Prakhonong, Bangkok 10260

Page 1 of 3

Equipment: CHAMBER (Incubator)
Manufacturer: BINDER
Model: BD 53
Serial No.: 13-07343
ID No.: UAE.MIC.005/2558
Order No.: 2504165
Operation No.: 2504165-001
Date of Receipt: 31 July 2025
Date of Calibration: 31 July 2025

Calibrated by Mr.Yothin Charoensuk **Approved by** [Signature]
Scientist Manager, Division of Calibration Laboratory
Date of Issue: 7 August 2025 **Responsible for the Technical Management Team**

The uncertainties are for a confidence probability of approximately 95 %.
This Certificate is issued in accordance with the conditions of accreditation granted by the Thai Laboratory Accreditation scheme which has assessed the measurement capability of the laboratory and its traceability to recognized national standards and to the units of measurement realized at the corresponding national standards laboratory. This certificate may not be reproduced other than in full except with the prior written approval of the National Food Institute.

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

Calibration Report

Certificate No.: 2504165-001-01
Equipment: CHAMBER (Incubator)
Model: BD 53 **Serial No.:** 13-07343
Resolution: 0.1 °C **ID No.:** UAE.MIC.005/2558
Manufacturer: BINDER
Date of Calibration: 31 July 2025

Page 2 of 3

Location: Microbiology Laboratory (302), UNITED ANALYST AND ENGINEERING CONSULTANT CO.,LTD.
Environment Condition: Ambient Temperature (26.1 ± 1) °C
Relative Humidity (64.3 ± 1) %
Line Voltage (222.5 ± 3) Volt

Condition of this results of Calibration:

- This instrument was calibrated by insert 9 standard thermometer into its chamber and calibration according to W-TE-014 Based on TLAS G-20-1/02-08 (E): Guidelines for Calibration and Checks of Temperature Controlled Enclosures.
- The temperature scale used was based on ITS - 90.
- All data show below were final values and the initial data may be obtained upon request.
- Reference Standard Instrument:

Instrument	Model	Serial No./ID No.	Certificate No.	Due Date	Through
Digital Thermometer with sensor	34972A	MYS7003188	2503175-002-01	2 June 2026	NATIONAL FOOD INSTITUTE
	RTD	CH1101 109/RTD#101-109			

- This certificate is traceable to International System of Units (SI Units).
- This certificate was certified only for the instrument we calibrated.
- This result of calibration was found accurate as shown on date and place of calibration only.
- Condition of Calibrated Item : Good

UUC Description :

Time of Record	1 Hour	9 Minute	At 44.0 °C
Fresh air Damper	Open	Position	-
	X Close	Fan	-
	-	Not Available	

- Result of Calibration : ☒ Without adjustment ☐ After adjustment

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

Calibration Report

Certificate No.: 2504165-001-01
Equipment: CHAMBER (Incubator)
Model: BD 53 **Serial No.:** 13-07343
Resolution: 0.1 °C **ID No.:** UAE.MIC.005/2558
Manufacturer: BINDER
Date of Calibration: 31 July 2025

Page 3 of 3

Calibration point: 44.0 °C

Calibration result:

Calibration Condition	Temperature (°C)	Relative Humidity (%)	Line Voltage (Volt)
MIN	25.2	63.2	220.0
MAX	26.6	65.3	225.0

Table 1 : Reporting of Temperature

Calibration point (°C)	Measured Temperature (°C) @ Sensor No. (Sensor No.9 is REF)									Uncertainty ± (°C)
44.0	#1	#2	#3	#4	#5	#6	#7	#8	#9	0.31
	44.63	44.64	44.38	44.46	44.09	44.25	44.00	43.57	44.05	

Table 2 : Reporting of Characterization Result

UUC* Setting (°C)	UUC* Reading (°C)			Stability ± (°C)	Uniformity (°C)	Overall Variation (°C)
	MIN	MAX	Average			
44.0	44.0	44.0	44.0	0.086	0.59	1.2

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

UUC* = Unit Under Calibration

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

Uniformity = The maximum difference of measured temperatures at any sensors and the measured temperature at the reference location which are observed at the same time.

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

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

***** End *****

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