

## เอกสารแนบ 6

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เอกสารสอบเทียบเครื่องมือที่ใช้ในการวิเคราะห์



# CALIBRATION LABORATORY Co., LTD.

2/10-11,14,55 Soi Prasert Manukit 29 Yaek 4, Prasert Manukit Rd., Ladphrao, Bangkok 10230  
Tel. 02-578-0353-4 Fax: 02-578-2672 www.cal-laboratory.com E-mail:sale@cal-laboratory.com



NSC-TISI-TIS 17025  
CALIBRATION 0059  
CLC

## CERTIFICATE OF CALIBRATION

### FOR

NOMENCLATURE : BALANCE  
MANUFACTURER : METTLER TOLEDO  
MODEL / TYPE : MS204TS/00  
SERIAL NO. : B935191252[LA-002]  
CLID. NO. : 362200356  
JOB CONTROL NO. : 240307024790  
CALIBRATION SERVICE : ☐ IN-LABORATORY ☒ ON-SITE

CUSTOMER : ENVIRONMENTAL MEASUREMENTS CO., LTD.

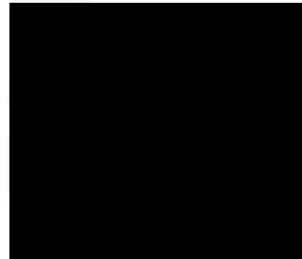
5/45 BAAN KLANG KRUNG BIZ TOWN, SOI SRINAGARINDRA 46/1 (PRAMOTE),  
NONG BON SUB-DISTRICT, PRAWET DISTRICT, BANGKOK 10250

DATE OF RECEIVED : 07 March 2024

DATE OF ISSUED : 08 April 2024

The report of calibration shall not be reproduced except in full without approval of the Calibration Laboratory Co., Ltd.

Calibrated By :



Approved By :

This Calibration Certificate documents the traceability to national standards, which realize the units of measurement according to the International System of Units (SI)

Certificate No. Q24024790

F3-011-05/12-23

Certificate No. Q24024790

F3-011-05/12-23

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# CALIBRATION LABORATORY Co., LTD.

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Tel. 02-578-0353-4 Fax: 02-578-2672 www.cal-laboratory.com E-mail:sale@cal-laboratory.com



NSC-TISI-TIS 17025  
CALIBRATION 0059  
CLC

## REPORT OF CALIBRATION

### FOR

NOMENCLATURE : BALANCE  
MANUFACTURER : METTLER TOLEDO  
MODEL / TYPE : MS204TS/00  
SERIAL NO. : B935191252[LA-002]  
LOCATION SITE : LABORATORY - BALANCE ROOM  
DATE OF CALIBRATION : 04 April 2024

#### ENVIRONMENT CONDITIONS :

Temperature : 24 °C to 25 °C

Relative Humidity : 50 % to 51 %

#### PROCEDURE USED :

This instrument was calibrated under procedure No. WI-305-46 based on EURAMET cg-18 Version 4.0 (11/2015).

The calibration was performed by Comparison with Weight Set which maintained by the Calibration Laboratory Co., Ltd.

#### REFERENCE STANDARD USED :

1. Weight Set, Phoenix Class E2 S/N. WBS-SET-E2-01.
2. Weight, Sartorius Class E2 S/N. 44329129, 43529037, 44329167, 43529293.

#### TRACEABILITY :

1. The measurements are traceable to International System of Units (SI), through National Institute of Metrology (Thailand). Certificate No. MM-0123-22, Due Date 22 August 2024.
2. The measurements are traceable to International System of Units (SI), through Sartorius Lab Instruments GmbH & Co. KG. Certificate No. M141607, M141608, M141609, M141611. Due Date 15 September 2025.

#### UNCERTAINTY :

The reported expanded uncertainty of measurement is stated as the standard uncertainty multiplied by the coverage factor complies with the table which for a normal distribution corresponds to a coverage probability of approximately 95%. It has been evaluated according to the "Evaluation of the Uncertainty of Measurement in Calibration (EA-4/02 M:2022)"

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**CONDITION OF CALIBRATION ITEM : RECEIVED IN GOOD OPERATIONAL CONDITION**  
**MEASUREMENT RESULTS : ( X ) without adjustment ( ) adjustment**

**CALIBRATION DATA**

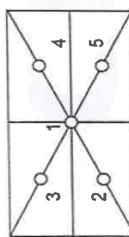
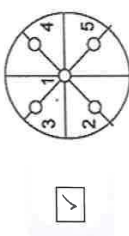

**1. Error of indications**

Nominal Test Value ( g )	Conventional mass ( g )	Display Value ( g )	Error of Balance ( g )	Uncertainty $\pm$ ( mg )	Coverage factor <i>k</i>
Unload	0.0000	0.0000	0.0000	0.07	2.00
0.1000	0.1000	0.0999	-0.0001	0.11	2.00
0.5000	0.5000	0.5000	0.0000	0.11	2.00
1.0000	1.0000	1.0000	0.0000	0.11	2.00
2.0000	2.0000	2.0000	0.0000	0.11	2.00
5.0000	5.0000	4.9999	-0.0001	0.11	2.00
10.0000	10.0000	9.9999	-0.0001	0.11	2.00

**2. Repeatability of indications**

Nominal Test Value ( g )	Standard Deviation of Reading ( g )
200.0000	0.00005

**3. Effect of eccentric application of a load on the indication**

					
					
Nominal Test Value ( g )	Display Value ( g )				
	Position 1	Position 2	Position 3	Position 4	Position 5
100.0000	100.0000	100.0001	100.0001	99.9999	100.0001
	Maximum Difference of Center Value ( g )				
	0.0001				

Note: The Scope of Accredited TISI Certificate No. 23-LB0092 Issue 02 Page 116 of 138

This report is valid for the above stated instrument/s only.

### End of Certificate ###

Certificate No. Q24024790  
F3-011-05/12-23

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**CERTIFICATE OF CALIBRATION**

**FOR**

NOMENCLATURE : BALANCE  
MANUFACTURER : SHIMADZU  
MODEL / TYPE : AP225WD  
SERIAL NO. : D316300692[LA-001]  
CLID. NO. : 362100172  
JOB CONTROL NO. : 240307024789  
CALIBRATION SERVICE : ☐ IN-LABORATORY ☒ ON-SITE

CUSTOMER : ENVIRONMENTAL MEASUREMENTS CO., LTD.

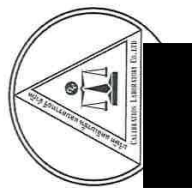
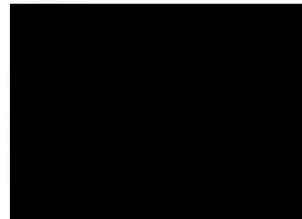
5/45 BAAN KLANG KRUNG BIZ TOWN, SOI SRINAGARINDRA 46/1 (PRAMOTE),  
NONG BON SUB-DISTRICT, PRAWET DISTRICT, BANGKOK 10250

DATE OF RECEIVED : 07 March 2024

DATE OF ISSUED : 05 April 2024

The report of calibration shall not be reproduced except in full without approval of the Calibration Laboratory Co., Ltd.

Calibrated By :



Approved By :

This Calibration Certificate documents the traceability to national standards, which realize the units of measurement according to the International System of Units (SI)

Certificate No. Q24024789

F3-011-05/12-23

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## REPORT OF CALIBRATION

### FOR

**NOMENCLATURE** : BALANCE  
**MANUFACTURER** : SHIMADZU  
**MODEL / TYPE** : AP225WD  
**SERIAL NO.** : D316300692[LA-001]  
**LOCATION SITE** : LABORATORY-BALANCE ROOM  
**DATE OF CALIBRATION** : 04 April 2024

#### ENVIRONMENT CONDITIONS :

Temperature : 23 °C to 24 °C Relative Humidity : 49 % to 50 %

#### PROCEDURE USED :

This instrument was calibrated under procedure No. WI-305-46 based on EURAMET/cg-18/Version 4.0 (11/2015).

The calibration was performed by Comparison with Weight Set which maintained by the Calibration Laboratory Co., Ltd.

#### REFERENCE STANDARD USED :

1. Weight Set, Phoenix Class E2 S/N. WBS-SET-E2-01.
2. Weight, Sartorius Class E2 S/N. 44329129, 43529037, 44329167, 43529293.

#### TRACEABILITY :

1. The measurements are traceable to International System of Units (SI), through National Institute of Metrology (Thailand). Certificate No. MM-0123-22, Due Date 22 August 2024.
2. The measurements are traceable to International System of Units (SI), through Sartorius Lab Instruments GmbH & Co. KG. Certificate No. M141607, M141608, M141609, M141611. Due Date 15 September 2025.

#### UNCERTAINTY :

The reported expanded uncertainty of measurement is stated as the standard uncertainty of measurement multiplied by the coverage factor complies with the table which for a normal distribution corresponds to a coverage probability of approximately 95%. It has been evaluated according to the "Evaluation of the Uncertainty of Measurement in Calibration (EA-4/02 M:2022)"

Certificate No. Q24024789

F3-011-05/12-23

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@clcalibration

CONDITION OF CALIBRATION ITEM : RECEIVED IN GOOD OPERATIONAL CONDITION  
MEASUREMENT RESULTS : ( X ) without adjustment ( ) adjustment

### CALIBRATION DATA

#### 1. Error of indications

Nominal Test Value ( g )	Conventional mass ( g )	Display Value ( g )	Error of Balance ( g )	Uncertainty ± ( mg )	Coverage factor k
Unload	0.0000	0.0000	0.0000	0.07	2.00
5.0000	5.0000	5.0000	0.0000	0.11	2.00
10.0000	10.0000	10.0001	+0.0001	0.11	2.00
20.0000	20.0000	20.0001	+0.0001	0.11	2.00
40.0000	40.0000	40.0001	+0.0001	0.13	2.00
60.0000	60.0000	60.0001	+0.0001	0.17	2.00
80.0000	80.0000	80.0002	+0.0002	0.17	2.00
100.0000	100.0000	100.0001	+0.0001	0.17	2.00
120.0000	120.0000	120.0001	+0.0001	0.29	2.00
140.0000	140.0000	140.0002	+0.0002	0.29	2.00
160.0000	160.0000	160.0002	+0.0002	0.29	2.00
180.0000	180.0000	180.0001	+0.0001	0.29	2.00
200.0000	200.0001	200.0001	0.0000	0.29	2.00

#### 2. Repeatability of indications

Nominal Test Value ( g )	Standard Deviation of Reading ( g )
200.0000	0.00005

#### 3. Effect of eccentric application of a load on the indication

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Note. The Scope of Accredited TISI Certificate No. 23-LB0092 Issue 02 Page 116 of 138

This report is valid for the above stated instrument/s only.

### End of Certificate ###

Certificate No. Q24024789

F3-011-05/12-23

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Tel: 02-578-0353-4 Fax: 02-578-2672 www.cal-laboratory.com E-mail: sale@cal-laboratory.com



ANAB  
Accredited  
CALIBRATION AND  
DIMENSIONAL MEASUREMENT  
ACDM-2814

## CERTIFICATE OF CALIBRATION

### FOR

NOMENCLATURE : DO METER  
MANUFACTURER : YSI  
MODEL / TYPE : 5000-230V/5010  
SERIAL NO. : 16D101626/19D100367[DOM-01]  
CLID. NO. : 272100329  
JOB CONTROL NO. : 240408038371  
CALIBRATION SERVICE : ☒ IN-LABORATORY ☐ ON-SITE

CUSTOMER : ENVIRONMENTAL MEASUREMENTS CO., LTD.

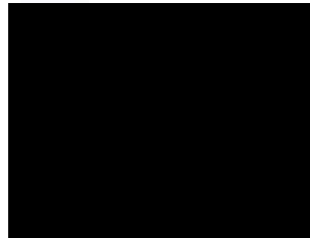
5/45 BAAN KLANG KRUNG BIZ TOWN, SOI SRINAGARINDRA 46/1 (PRAMOTE),  
NONG BON SUB-DISTRICT, PRAWET DISTRICT, BANGKOK 10250

DATE OF RECEIVED : 08 April 2024

DATE OF ISSUED : 10 April 2024

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Calibrated By :



Approved By :

This Calibration Certificate documents the traceability to national standards, which realize the units of measurement according to the International System of Units (SI)

Certificate No. Q24038371

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CALIBRATION AND  
DIMENSIONAL MEASUREMENT  
ACDM-2814

## REPORT OF CALIBRATION

### FOR

NOMENCLATURE : DO METER  
MANUFACTURER : YSI  
MODEL / TYPE : 5000-230V/5010  
SERIAL NO. : 16D101626/19D100367[DOM-01]  
DATE OF CALIBRATION : 09 April 2024

### ENVIRONMENT CONDITIONS :

Temperature :  $(25 \pm 2.5) ^\circ\text{C}$  Relative Humidity :  $(50 \pm 15) \% \text{RH}$

### PROCEDURE USED :

This instrument was calibrated under procedure No. CLC-CFCH-06. The calibration was performed by direct measurement with Certified Reference Material (CRM).

### REFERENCE STANDARD USED :

Dissolved Oxygen, Sigma-Aldrich Product ID QC3077-500ML.

### TRACEABILITY :

The measurements are traceable to International System of Units (SI), through Merck Co., Ltd.  
Lot LRAD3840, Due Date October 2024.

### UNCERTAINTY :

The reported expanded uncertainty of measurement is stated as the standard uncertainty of measurement multiplied by the coverage factor  $k = 2.00$  which for a normal distribution corresponds to a coverage probability of approximately 95 %.  
It has been evaluated according to the "Evaluation of the Uncertainty of Measurement in Calibration (EA-4/02 M:2022)"

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ISO/IEC 17025

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## CONDITION OF CALIBRATION ITEM : RECEIVED IN GOOD OPERATIONAL CONDITION MEASUREMENT RESULTS : ( X ) without adjustment ( ) adjustment

The table in the following gives the calibration results and associated measurement uncertainties of Do Meter.

### CALIBRATION DATA

#### CORRECTION OF DO METER @ 20°C

Nominal Value ( mg/L )	DUC Reading ( mg/L )	Correction ( mg/L )	Uncertainty ( mg/L )
7.78	7.80	-0.02	± 0.38

Note. The Scope of Accredited ANAB Certificate No. ACDM-2814 Version 012 Page 5 of 67

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### End of Certificate ###

Certificate No. Q24038371

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DIMENSIONAL MEASUREMENT  
ACDM-2814

## CERTIFICATE OF CALIBRATION

### FOR

NOMENCLATURE : HOT AIR OVEN  
MANUFACTURER : MEMMERT  
MODEL / TYPE : UF110  
SERIAL NO. : B422.0026[L/A-0012]  
CLID. NO. : 332202464  
JOB CONTROL NO. : 240307024791  
CALIBRATION SERVICE : ☐ IN-LABORATORY ☒ ON-SITE

CUSTOMER : ENVIRONMENTAL MEASUREMENTS CO., LTD.

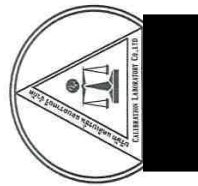
5/45 BAAN KLANG KRUNG BIZ TOWN, SOI SRINAGARINDRA 46/1 (PRAMOTE),  
NONG BON SUB-DISTRICT, PRAWET DISTRICT, BANGKOK 10250

DATE OF RECEIVED : 07 March 2024

DATE OF ISSUED : 06 April 2024

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Calibrated By :



Approved By :

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Certificate No. Q24024791

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A C C R E D I T E D  
CALIBRATION AND  
DIMENSIONAL MEASUREMENT  
ACQM-2814

## REPORT OF CALIBRATION

### FOR

NOMENCLATURE : HOT AIR OVEN  
MANUFACTURER : MEMMERT  
MODEL / TYPE : UF110  
SERIAL NO. : B422.0026[L A-0012]  
LOCATION SITE : LABORATORY-HOT ZONE  
DATE OF CALIBRATION : 04 April 2024

#### ENVIRONMENT CONDITIONS :

Temperature : 24 °C to 25 °C

Relative Humidity : 50% to 52 %

#### PROCEDURE USED :

This instrument was calibrated under procedure No. CLC-CPTH-07 based on TLAS G-20 as calibration guidelines.

The calibration was performed by using Hydra Data Logger which maintained by the Calibration Laboratory Co., Ltd.

#### REFERENCE STANDARD USED :

Hydra Data Logger, Fluke Model 2620 S/N: 5592550.

#### TRACEABILITY :

The measurements are traceable to International System of Units (SI), through Calibration Laboratory Co., Ltd.

Certificate No. Q23065868, Due Date 22 June 2024.

#### UNCERTAINTY :

The reported expanded uncertainty of measurement is stated as the standard uncertainty of measurement multiplied by the coverage factor complies with the table which for a normal distribution corresponds to a coverage probability of approximately 95 %.

It has been evaluated according to the "Evaluation of the Uncertainty of Measurement in Calibration (EA-4/02 M:2022)"

Certificate No. Q24024791

F3-011-05/12-23

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@clcalibration



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ISO/IEC 17025

# CALIBRATION LABORATORY Co., LTD.

2/10-11, 55 Soi Prasert Manukit 29 Yaek 4, Prasert Manukit Rd., Ladphrao, Bangkok 10230  
Tel. 02-578-0353-4 Fax: 02-578-2672 www.cal-laboratory.com E-mail: sale@cal-laboratory.com



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A C C R E D I T E D  
CALIBRATION AND  
DIMENSIONAL MEASUREMENT  
ACQM-2814

CONDITION OF CALIBRATION ITEM : RECEIVED IN GOOD OPERATIONAL CONDITION

MEASUREMENT RESULTS : (X) without adjustment ( ) adjustment

The table in the following gives the calibration results and associated measurement uncertainties of the measuring hot air oven.

### CALIBRATION DATA

#### 1. HOT AIR OVEN PERFORMANCE

Setting ( °C )	DUC		Measured Uniformity ( °C )	Measured Stability ( °C )	Measured Overall Variation ( °C )
	Indicating ( °C )				
104.0	104.0		0.81	0.07	1.20
180.0	180.0		1.35	0.19	2.17

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Certificate No. Q24024791

F3-011-05/12-23

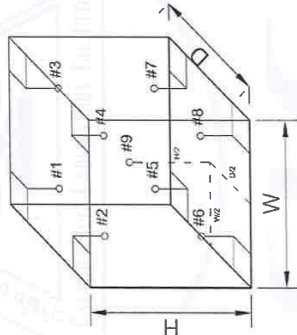
## CALIBRATION DATA

### 2. TEMPERATURE DISTRIBUTION

DUC	Measured Temperature (°C) @ Probe No. 9 is Ref.									Uncertainty ± (°C)	Coverage factor k
	Setting (°C)	1	2	3	4	5	6	7	8	9	
104.0	104.0	103.11	104.12	103.56	103.79	103.72	103.88	103.57	104.18	103.88	0.45
180.0	180.0	178.33	180.32	178.77	179.54	179.26	179.74	179.19	180.15	179.58	0.55

Technical Note : W = 56 cm, D = 40 cm, H = 48 cm.

Note. The Scope of Accredited ANAB Certificate No. ACDM-2814 Version 012 Page 58 of 67



This report is valid for the above stated instrument/s only.

### End of Certificate ###



## CERTIFICATE OF CALIBRATION

### FOR

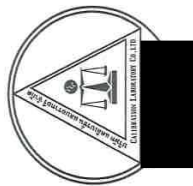
NOMENCLATURE : INCUBATOR  
MANUFACTURER : ACCUPLUS  
MODEL / TYPE : SMART 1250  
SERIAL NO. : 2059-0718-0010[LA-002]  
CLID. NO. : 332100155  
JOB CONTROL NO. : 240307024792  
CALIBRATION SERVICE : ☐ IN-LABORATORY ☒ ON-SITE  
CUSTOMER : ENVIRONMENTAL MEASUREMENTS CO., LTD.  
5/45 BAAN KLANG KRUNG BIZ TOWN, SOI SRINAGARINDRA 46/1 (PRAMOTE),  
NONG BON SUB-DISTRICT, PRAWET DISTRICT, BANGKOK 10250

DATE OF RECEIVED : 07 March 2024

DATE OF ISSUED : 06 April 2024

The report of calibration shall not be reproduced except in full without approval of the Calibration Laboratory Co., Ltd.

Calibrated By :



Approved By :

This Calibration Certificate documents the traceability to national standards, which realize the units of measurement according to the International System of Units (SI)

Certificate No. Q24024792  
F3-011-05/12-23







# CALIBRATION LABORATORY Co., LTD.

2/10-11,14,55 Soi Prasert Manukit 29 Yaek 4, Ladphrao, Bangkok 10230  
Tel. 02-578-0353-4 Fax: 02-578-2672 www.cal-laboratory.com E-mail:sale@cal-laboratory.com



NSC-TISI-TIS 17025  
CALIBRATION 0059  
CLC

## REPORT OF CALIBRATION

### FOR

NOMENCLATURE : INCUBATOR  
MANUFACTURER : ACCUPLUS  
MODEL / TYPE : SMART 1250  
SERIAL NO. : 2059-0718-0010[LA-002]  
LOCATION SITE : LABORATORY  
DATE OF CALIBRATION : 04 April 2024

#### ENVIRONMENT CONDITIONS :

Temperature : 24 °C to 25 °C

Relative Humidity : 50 % to 52 %

#### PROCEDURE USED :

This instrument was calibrated under procedure No. W1-305-165 based on TLAS G-20-1/02-08 as calibration guidelines.  
The calibration was performed by using Hydra Data Logger which maintained by the Calibration Laboratory Co., Ltd.

#### REFERENCE STANDARD USED :

Hydra Data Logger, Fluke Model 2620 S/N. 5592550.

#### TRACEABILITY :

The measurements are traceable to International System of Units (SI) , through Calibration Laboratory Co., Ltd.  
Certificate No. Q23065868, Due Date 22 June 2024.

#### UNCERTAINTY :

The reported expanded uncertainty of measurement is stated as the standard uncertainty of measurement multiplied by the coverage factor complies with the table which for a normal distribution corresponds to a coverage probability of approximately 95 % .  
It has been evaluated according to the "Evaluation of the Uncertainty of Measurement in Calibration (EA-4/02 M:2022)"

Certificate No. Q24024792

F3-011-05/12-23

page 2 of 4



@cdcalibration



# CALIBRATION LABORATORY Co., LTD.

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NSC-TISI-TIS 17025  
CALIBRATION 0059  
CLC

## CONDITION OF CALIBRATION ITEM : RECEIVED IN GOOD OPERATIONAL CONDITION

### MEASUREMENT RESULTS : ( X ) without adjustment ( ) adjustment

The table in the following gives the calibration results and associated measurement uncertainties of the measuring incubator.

#### CALIBRATION DATA

##### 1. INCUBATOR PERFORMANCE

Setting ( °C )	DUC		Measured Uniformity ( °C )	Measured Stability ( °C )	Measured Overall Variation ( °C )
	Indicating ( °C )				
20.0	20.0	0.52	0.46	1.06	

Certificate No. Q24024792

F3-011-05/12-23

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@cdcalibration

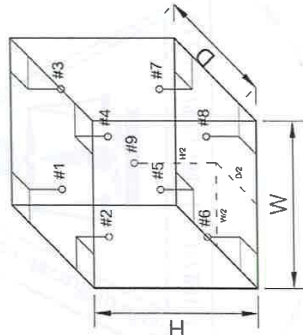
## 2. TEMPERATURE DISTRIBUTION

### CALIBRATION DATA

DUC	Measured Temperature ( °C )@Probe No.9 is Ref.									Uncertainty ± ( °C )	Coverage factor k
	Setting ( °C )	1	2	3	4	5	6	7	8	9	
20.0	20.0	20.58	20.70	20.70	20.46	20.54	20.53	20.53	20.36	20.39	2.00

Technical Note : W = 50 cm, D = 48 cm, H = 110 cm.

The Scope of Accredited TISI Certificate No. 23-LB0092 Issue 02 Page 129 of 138



This report is valid for the above stated instrument/s only.

### End of Certificate ###



## CERTIFICATE OF CALIBRATION

### FOR

NOMENCLATURE : pH METER  
MANUFACTURER : APERA  
MODEL / TYPE : PH700/201T-F  
SERIAL NO. : PH700X1019061009/N/A [PH-02]  
CLID. NO. : 272401000

JOB CONTROL NO. : 240521051980

CALIBRATION SERVICE : ☒ IN-LABORATORY ☐ ON-SITE

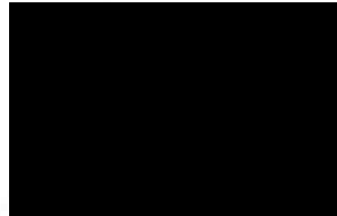
CUSTOMER : ENVIRONMENTAL MEASUREMENTS CO., LTD.

5/45 BAAN KLANG KRUNG BIZ TOWN, SOI SRINAGARINDRA 46/1 (PRAMOTE),  
NONG BON SUB-DISTRICT, PRAWET DISTRICT, BANGKOK 10250

DATE OF RECEIVED : 21 May 2024 DATE OF ISSUED : 23 May 2024

The report of calibration shall not be reproduced except in full without approval of the Calibration Laboratory Co., Ltd.

Calibrated By :



Approved By :

This Calibration Certificate documents the traceability to national standards, which realize the units of measurement according to the International System of Units (SI)

Certificate No. Q24051980  
F3-011-05/12-23

page 1 of 4





CALIBRATION LABORATORY Co., LTD.

2710-11,14, 55 Soi Prasert Manukit 29 Yaek 4, Prasert Manukit Rd., Ladphrao, Bangkok 10230  
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NSC-TISF-TIS 17025  
CALIBRATION 0059  
CLC

## REPORT OF CALIBRATION

### FOR

NOMENCLATURE : pH METER  
MANUFACTURER : APERA  
MODEL / TYPE : PH700/201T-F  
SERIAL NO. : PH700X1019061009/N/A [PH-02]  
DATE OF CALIBRATION : 22 May 2024

#### ENVIRONMENT CONDITIONS :

Temperature :  $(25 \pm 2.5) ^\circ\text{C}$  Relative Humidity :  $(50 \pm 15) \% \text{ RH}$

#### PROCEDURE USED :

This instrument was calibrated under procedure No. WI-305-128, 238. The calibration was performed by direct measurement with Certified Reference Material (CRM) and comparison with Calibration Bath, Precision Thermometer and IPT which maintained by the Calibration Laboratory Co., Ltd.

#### REFERENCE STANDARD USED :

1. pH Standard Solution, NIMT TRM CODE TRM-S-2003, TRM CODE TRM-S-2007.
2. pH Standard Solution, Control Company Catalog Number 06664260,11754256, Lot Number CC787362.
3. Calibration Bath, Kambic Model OB-22/2 ULT S/N. 171115653.
4. Precision Thermometer, ASL Model F200-A-8 S/N. 014433/03.
5. IPT, ASL Model T100-250-1D S/N. L0193A-1-1.

Certificate No. Q24051980

F3-011-05/12-23

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NSC-TISF-TIS 17025  
CALIBRATION 0059  
CLC

#### TRACEABILITY :

1. The measurements are traceable to International System of Units (SI), through National Institute of Metrology (Thailand).  
Lot Number: 040822, 120124, Due Date 04 March 2025.
2. The measurements are traceable to International System of Units (SI), through Control Company.  
Certificate No. 4281-14495731, Due Date 27 September 2025.
3. The measurements are traceable to International System of Units (SI), through Calibration Laboratory Co., Ltd.  
Certificate No. Q23136342, Due Date 20 December 2024.
4. The measurements are traceable to International System of Units (SI), through Thailand Institute of Scientific and Technological Research (TISTR). Certificate No. PSL-T 0203/67, Due Date 07 December 2024.
5. The measurements are traceable to International System of Units (SI), through National Institute of Metrology (Thailand).  
Certificate No. TT-0136-23, Due Date 12 December 2024.

#### UNCERTAINTY :

The reported expanded uncertainty of measurement is stated as the standard uncertainty of measurement multiplied by the coverage factor complies with the table which for a normal distribution corresponds to a coverage probability of approximately 95 %.  
It has been evaluated according to the "Evaluation of the Uncertainty of Measurement in Calibration (EA-4/02 M:2022)"

Certificate No. Q24051980

F3-011-05/12-23

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@clcalibration



**CONDITION OF CALIBRATION ITEM : RECEIVED IN GOOD OPERATIONAL CONDITION**

**MEASUREMENT RESULTS : ( X ) without adjustment ( ) adjustment**

The table in the following gives the calibration results and associated measurement uncertainties of pH meter.

**CALIBRATION DATA**

**1. pH METER RESULT @ 25 °C**

Standard pH Buffer Solution (pH)	pH Meter Reading (pH)	pH Meter Reading (mV)	Correction (pH)	Uncertainty of Measurement (± pH)	k Factor
4.003	4.00	180	+0.003	0.014	2.00
7.005	7.00	1	+0.005	0.014	2.00
10.015	10.01	-168	+0.005	0.100	2.00

Technical Note. Setting function CAL.3 point (4,7,10).

Note. The Scope of Accredited TISI Certificate No. 23-LB0092 Issue 02 Page 91 of 138

**\*2. TEMPERATURE RESULT [ pH PROBE ]**

Immersion depth (mm)	Actual Temperature (°C)	DUC Reading (°C)	Correction (°C)	Uncertainty ± (°C)
100	25.00	25.0	0.00	0.07

Note. Probe Ø 12 mm

\* means Calibrations marked " Not TISI Accredited " in this Certificate have been included for completeness.

The reported uncertainty is based on a standard uncertainty multiplied by coverage factor of  $k = 2.00$ .

This report is valid for the above stated instrument/s only.

### End of Certificate ###

Certificate No. Q24051980

F3-011-05/12-23

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@ccalibration



**CERTIFICATE OF CALIBRATION**

**FOR**

NOMENCLATURE : REFRIGERATOR  
MANUFACTURER : MEDICOOL  
MODEL / TYPE : BB-117  
SERIAL NO. : BB117-190725001[LA-003]  
CLID. NO. : 332100156  
JOB CONTROL NO. : 240307024793  
CALIBRATION SERVICE : ☐ IN-LABORATORY ☒ ON-SITE

CUSTOMER : ENVIRONMENTAL MEASUREMENTS CO., LTD.

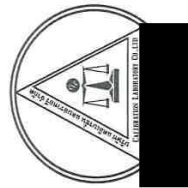
5/45 BAAN KLANG KRUNG BIZ TOWN, SOI SRINAGARINDRA 46/1 (PRAMOTE),  
NONG BON SUB-DISTRICT, PRAWET DISTRICT, BANGKOK 10250

DATE OF RECEIVED : 07 March 2024

DATE OF ISSUED : 06 April 2024

The report of calibration shall not be reproduced except in full without approval of the Calibration Laboratory Co., Ltd.

Calibrated By :



Approved By :

This Calibration Certificate documents the traceability to national standards, which realize the units of measurement according to the International System of Units (SI)

Certificate No. Q24024793

F3-011-05/12-23

page 1 of 4



@ccalibration



# CALIBRATION LABORATORY Co., LTD.

2/10-11, 14, 55 Soi Prasert Manukit 29 Yaek 4, Prasert Manukit Rd., Ladphrao, Bangkok 10230  
Tel. 02-578-0353-4 Fax: 02-578-2672 www.cal-laboratory.com E-mail:sale@cal-laboratory.com



## REPORT OF CALIBRATION

### FOR

NOMENCLATURE : REFRIGERATOR  
MANUFACTURER : MEDICOOL  
MODEL / TYPE : BB-117  
SERIAL NO. : BB117-190725001[LA-003]  
LOCATION SITE : LABORATORY  
DATE OF CALIBRATION : 04 April 2024

#### ENVIRONMENT CONDITIONS :

Temperature : 24 °C to 25 °C Relative Humidity : 50 % to 52 %

#### PROCEDURE USED :

This instrument was calibrated under procedure No. WI-305-165 based on TLAS G-20-1/02-08 as calibration guidelines.  
The calibration was performed by using Hydra Data Logger which maintained by the Calibration Laboratory Co., Ltd.

#### REFERENCE STANDARD USED :

Hydra Data Logger, Fluke Model 2620 S/N. 5592550.

#### TRACEABILITY :

The measurements are traceable to International System of Units (SI), through Calibration Laboratory Co., Ltd.  
Certificate No. Q23065868, Due Date 22 June 2024.

#### UNCERTAINTY :

The reported expanded uncertainty of measurement is stated as the standard uncertainty of measurement multiplied by the coverage factor complies with the table which for a normal distribution corresponds to a coverage probability of approximately 95 %.  
It has been evaluated according to the "Evaluation of the Uncertainty of Measurement in Calibration (EA-4/02 M:2022)"

Certificate No. Q24024793

F3-011-05/12-23



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# CALIBRATION LABORATORY Co., LTD.

2/10-11, 14, 55 Soi Prasert Manukit 29 Yaek 4, Prasert Manukit Rd., Ladphrao, Bangkok 10230  
Tel. 02-578-0353-4 Fax: 02-578-2672 www.cal-laboratory.com E-mail:sale@cal-laboratory.com



## CONDITION OF CALIBRATION ITEM : RECEIVED IN GOOD OPERATIONAL CONDITION MEASUREMENT RESULTS : (X) without adjustment ( ) adjustment

The table in the following gives the calibration results and associated measurement uncertainties of the measuring refrigerator.

### CALIBRATION DATA

#### 1. REFRIGERATOR PERFORMANCE

Setting ( °C )	DUC		Measured Uniformity ( °C )	Measured Stability ( °C )	Measured Overall Variation ( °C )
	Indicating ( °C )				
4.0	4.0		0.82	1.14	2.49

Certificate No. Q24024793

F3-011-05/12-23



@clcalibration



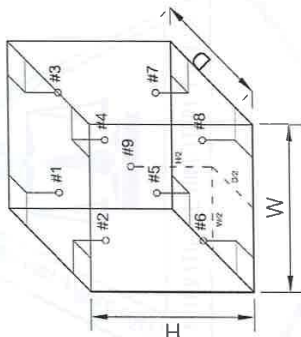
**CALIBRATION DATA**

**2. TEMPERATURE DISTRIBUTION**

DUC		Measured Temperature ( °C ) @Probe No.9 is Ref.									Uncertainty ± ( °C )	Coverage factor k
Setting ( °C )	Indicating ( °C )	1	2	3	4	5	6	7	8	9		
4.0	4.0	3.22	3.93	3.21	3.93	3.52	3.29	3.02	3.18	3.31	1.40	2.00

Technical Note : W = 50 cm, D = 50 cm, H = 120 cm.

The Scope of Accredited TISI Certificate No. 23-LB0092 Issue 02 Page 129 of 138



This report is valid for the above stated instrument/s only.

### End of Certificate ###



# Certificate of Calibration

Certificate Number : SPR24050208-1 Page : 1 of 3

Customer : ENVIRONMENTAL MEASUREMENTS CO., LTD.

5/45 Baan Klang Krung Biz Town, Soi Srinagarindra 46/1 (Pranote),  
Nongbon Sub-district, Prawet District, Bangkok 10250

Equipment Name	: Soil Hydrometer
Manufacturer	: Precision
Model	: ASTM 152H
Serial Number	: 061
ID. Number	: N/A
Environmental Conditions	
Ambient Temperature	: 20 °C ± 1 °C
Relative Humidity	: 50 % ± 15 %
Location of Calibration	: In-Lab
Calibration Procedure	: SP-CPM-04-14
Received Date	: 14 May 2024
Calibration Date	: 16 May 2024
Recommend Due Date	: N/A
Date of Issue	: 17 May 2024

## Method of Calibration

This certifies that the above instrument was calibrated in compliance with the calibration system requirement of ISO/IEC 17025:2017 in accordance with reference procedure. Standards used to perform this calibration are certified by to NIST or equivalent, National metrology institute, Natural physical constants, consensus standards. The result reported herein apply only to the calibration of the item described above as received. Our decision rule is to contact the customer if the item pass and fail calibration when the results include the uncertainties and the customer must determine if the results meets their needs. The calibration certificate shall not be reproduced except in full, without written approval of SP Metrology System (Thailand).

Calibrated by :

Calibration Officer

Approved by

Authorized Signatory

Certificate No. : SPR24050208-1

Range : -5 to 60 g/l Resolution : 1 g/l Accuracy ( ± ) : 1 g/l

Hydrometer Measurement @ 20 °C Unit : g/l

Standard Value	UUC Reading	Error	Uncertainty ( ± )
-0.049	0	0.049	0.23
30.093	30	-0.093	0.23
60.032	60	-0.032	0.24

Note:

The result of calibration was found accurate as show on date and place of calibration only.  
This Certificate is not certified for any commercial transaction.

Measurement Uncertainty

The reported uncertainty of measurement is the expanded uncertainty obtained by multiplying the standard uncertainty with the coverage factor k = 2, providing a level of confidence approximately 95%.

- End of Certificate -

Certificate Number : SPR24050208-1

Reference Standards

Equipment Name	Model	Serial No.	Certificate No.	Due Date
Digimatic Micrometer	293-821-30	45121126	SPR24020353-4	14 Mar 2025
Electronic Balance	N/A	14246789	SPR23100036-7	15 Oct 2024
Barometer	MHB-382SD	52188	SPR24020353-10	16 Mar 2025
Standard Weight Ring	N/A	N/A	SPR24010142-26	11 Jan 2025
Digital Thermometer With PRT	GT11/3850-40-392	08000098/100288	SPR23070077-4	20 Jul 2024

Traceability

This certification is traceable to the International System of Unit maintained at :  
SP Metrology - SP Metrology system (Thailand) Co.Ltd.



## Certificate of Calibration

Certificate Number : SPR24050208-2

Customer : ENVIRONMENTAL MEASUREMENTS CO., LTD.

5/45 Baan Klang Krung Biz Town, Soi Sirinagarindra 48/1 (Pranote),  
Nongbon Sub-district, Prawet District, Bangkok 10250

Page : 2 of 3

Certificate Number : SPR24050208-2

## Calibration Report

### Reference Standards

Equipment Name	Model	Serial No.	Certificate No.	Due. Date
Digimatic Micrometer	293-821-30	45121126	SPR24020353-4	14 Mar 2025
Electronic Balance	N/A	14246789	SPR23100036-7	15 Oct 2024
Barometer	MHB-382SD	52188	SPR24020353-10	16 Mar 2025
Standard Weight Ring	N/A	N/A	SPR24010142-26	11 Jan 2025
Digital Thermometer With PRT	GT11/3850-40-392	08000098/100288	SPR23070077-4	20 Jul 2024

### Traceability

This certification is traceable to the International System of Unit maintained at :  
SP Metrology - SP Metrology system (Thailand) Co.Ltd.

69/29 Moo 1 Klongsi Klongluang Pathumthani 12120 ( Thailand ) Tel: (662) 193-2220 5 คู่มือสาย www.สอบเทียบเครื่องมือวัด.com

SP-FM-04-15 rev.0



## Certificate of Calibration

Certificate Number : SPR24050208-2

Customer : ENVIRONMENTAL MEASUREMENTS CO., LTD.

5/45 Baan Klang Krung Biz Town, Soi Sirinagarindra 48/1 (Pranote),  
Nongbon Sub-district, Prawet District, Bangkok 10250

Page : 2 of 3

Certificate Number : SPR24050208-2

## Calibration Report

### Reference Standards

Equipment Name	Model	Serial No.	Certificate No.	Due. Date
Digimatic Micrometer	293-821-30	45121126	SPR24020353-4	14 Mar 2025
Electronic Balance	N/A	14246789	SPR23100036-7	15 Oct 2024
Barometer	MHB-382SD	52188	SPR24020353-10	16 Mar 2025
Standard Weight Ring	N/A	N/A	SPR24010142-26	11 Jan 2025
Digital Thermometer With PRT	GT11/3850-40-392	08000098/100288	SPR23070077-4	20 Jul 2024

### Traceability

This certification is traceable to the International System of Unit maintained at :  
SP Metrology - SP Metrology system (Thailand) Co.Ltd.

69/29 Moo 1 Klongsi Klongluang Pathumthani 12120 ( Thailand ) Tel: (662) 193-2220 5 คู่มือสาย www.สอบเทียบเครื่องมือวัด.com

SP-FM-04-15 rev.0





## Result of Calibration

Certificate No. : SPR24050208-2

Page : 3 of 3

Range : -5 to 60 g/l Resolution : 1 g/l Accuracy ( $\pm$ ) : 1 g/l

Hydrometer Measurement @ 20 °C

Unit : g/l

Standard Value	UUC Reading	Error	Uncertainty ( $\pm$ )
-0.048	0	0.048	0.23
30.089	30	-0.089	0.23
60.041	60	-0.041	0.24

### Note:

The result of calibration was found accurate as show on date and place of calibration only.  
This Certificate is not certified for any commercial transaction.

### Measurement Uncertainty

The reported uncertainty of measurement is the expanded uncertainty obtained by multiplying the standard uncertainty with the coverage factor  $k = 2$ , providing a level of confidence approximately 95%.

- End of Certificate -



CLC  
ACCREDITED  
ISO/IEC 17025

21/0-11,14,55 Soi Prasert Manukit 29 Yaek 4, Prasert Manukit Rd., Ladphrao, Bangkok 10230  
Tel: 02-578-0353-4 Fax: 02-578-2672 www.cal-laboratory.com E-mail: sale@cal-laboratory.com



## CERTIFICATE OF CALIBRATION

### FOR

NOMENCLATURE : DIGITAL THERMOMETER WITH PROBE  
MANUFACTURER : LUTRON  
MODEL / TYPE : MTM-380SD  
SERIAL NO. : I.570147/N/A[LA-0013/LA-0013/A]  
CLID. NO. : 232204019  
JOB CONTROL NO. : 240408038373  
CALIBRATION SERVICE : ☒ IN-LABORATORY ☐ ON-SITE  
CUSTOMER : ENVIRONMENTAL MEASUREMENTS CO., LTD.

5/45 BAAN KLANG KRUNG BIZ TOWN, SOI SRINAGARINDRA 46/1 (PRAMOTE),  
NONG BON SUB-DISTRICT, PRAWET DISTRICT, BANGKOK 10250

DATE OF RECEIVED : 08 April 2024

DATE OF ISSUED : 10 April 2024

The report of calibration shall not be reproduced except in full without approval of the Calibration Laboratory Co., Ltd.

Calibrated By :

Approved By :

This Calibration Certificate documents the traceability to national standards, which realize the units of measurement according to the International System of Units ( SI )

Certificate No. Q24038373

F3-011-05/12-23

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## REPORT OF CALIBRATION

### FOR

NOMENCLATURE : DIGITAL THERMOMETER WITH PROBE  
MANUFACTURER : LUTRON  
MODEL / TYPE : MTM-380SD  
SERIAL NO. : 1.570147/N/A[LA-0013/LA-0013/A]  
DATE OF CALIBRATION : 09 April 2024

#### ENVIRONMENT CONDITIONS :

Temperature :  $(23 \pm 2) ^\circ\text{C}$  Relative Humidity :  $(55 \pm 10) \% \text{ RH}$

#### PROCEDURE USED :

This instrument was calibrated under procedure No. CLC-CPTH-06 based on ASTM E 220-86 as calibration guidelines.

The calibration was performed by using Calibration Bath, Precision Thermometer and IPRT which maintained by the Calibration Laboratory Co., Ltd.

#### REFERENCE STANDARD USED :

1. Calibration Bath, Kambic Model OB-22/2 ULT, OB-22/2 S/N. 17115653, 17115654.
2. Precision Thermometer, ASL Model F200-A-8 S/N. 014433/03.
3. IPRT, ASL Model TT100-250-1D, TT100-450-1D S/N. L0193A-1-1, L1123A-1-5.

#### TRACEABILITY :

1. The measurements are traceable to International System of Units (SI), through Calibration Laboratory Co., Ltd. Certificate No. Q23136342, Q23126517. Due Date 20 December 2024, 20 November 2024.
2. The measurements are traceable to International System of Units (SI), through Thailand Institute of Scientific and Technological Research (TISTR). Certificate No. PSL-T 0203/67, Due Date 07 December 2024.
3. The measurements are traceable to International System of Units (SI), through National Institute of Metrology (Thailand). Certificate No. TT-0136-23, TT-0132-23. Due Date 12 December 2024, 22 November 2024.

#### UNCERTAINTY :

The reported expanded uncertainty of measurement is stated as the standard uncertainty of measurement multiplied by the coverage factor  $k = 2,00$  which for a normal distribution corresponds to a coverage probability of approximately 95 %. It has been evaluated according to the "Evaluation of the Uncertainty of Measurement in Calibration (EA-4/02 M:2022)"

Certificate No. Q24038373

F3-011-05/12-23

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calibration



## CONDITION OF CALIBRATION ITEM : RECEIVED IN GOOD OPERATIONAL CONDITION

### MEASUREMENT RESULTS : ( X ) without adjustment ( ) adjustment

The DUC Reading were recorded and the means value were reported of five times measurement in the table below.

#### CALIBRATION DATA

#### CORRECTION OF TEMPERATURE : T1 [ THERMOCOUPLE TYPE K ]

Immersion depth (mm)	Actual Temperature (°C)	DUC Reading (°C)	Correction (°C)	Uncertainty $\pm$ (°C)
200	4.00	4.2	-0.20	0.52
	20.01	20.3	-0.29	
	95.04	95.6	-0.56	
	104.02	104.9	-0.88	
	180.03	181.4	-1.37	

Note. The Scope of Accredited ANAB Certificate No. ACDM-2814 Version 012 Page 56 of 67

This report is valid for the above stated instrument/s only.

### End of Certificate ###

Certificate No. Q24038373

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calibration





# CALIBRATION LABORATORY Co., LTD.

2/10-11, 14, 55 Soi Prasert Manukit 29 Yaek 4, Prasert Manukit Rd., Ladphrao, Bangkok 10230  
Tel. 02-578-0353-4 Fax. 02-578-2672 www.cal-laboratory.com E-mail: sale@cal-laboratory.com



ANAB National Accreditation Board  
ACCREDITED  
CALIBRATION AND  
MAINTENANCE  
ACDM-2814

## CERTIFICATE OF CALIBRATION

### FOR

NOMENCLATURE : DIGITAL THERMOHYGRO METER  
MANUFACTURER : DIGICON  
MODEL / TYPE : TH-02A  
SERIAL NO. : 1919E0284991[DTH-01]  
CLID. NO. : 232100200  
JOB CONTROL NO. : 240408038369  
CALIBRATION SERVICE : ☒ IN-LABORATORY ☐ ON-SITE

CUSTOMER : ENVIRONMENTAL MEASUREMENTS CO., LTD.

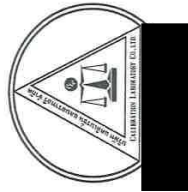
5/45 BAAK KLANG KRUNG BIZ TOWN, SOI SRINAGARINDRA 46/1 (PRAMOTE),  
NONG BON SUB-DISTRICT, PRAWET DISTRICT, BANGKOK 10250

DATE OF RECEIVED : 08 April 2024

DATE OF ISSUED : 17 April 2024

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Calibrated By :



Approved By :

This Calibration Certificate documents the traceability to national standards, which realize the units of measurement according to the International System of Units (SI)

Certificate No. Q24038369

F3-011-05/12-23

page 1 of 3



@ckcalibration



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Tel. 02-578-0353-4 Fax. 02-578-2672 www.cal-laboratory.com E-mail: sale@cal-laboratory.com



ANAB National Accreditation Board  
ACCREDITED  
CALIBRATION AND  
MAINTENANCE  
ACDM-2814

## REPORT OF CALIBRATION

### FOR

NOMENCLATURE : DIGITAL THERMOHYGRO METER  
MANUFACTURER : DIGICON  
MODEL / TYPE : TH-02A  
SERIAL NO. : 1919E0284991[DTH-01]  
DATE OF CALIBRATION : 10 April 2024

#### ENVIRONMENT CONDITIONS :

Temperature :  $(23 \pm 2) ^\circ\text{C}$  Relative Humidity :  $(55 \pm 10) \% \text{RH}$

#### PROCEDURE USED :

This instrument was calibrated under procedure No. CLC-CPTH-11. The calibration was performed by using Chilled Mirror Hygrometer which maintained by the Calibration Laboratory Co., Ltd.

#### REFERENCE STANDARD USED :

Chilled Mirror Hygrometer, Edgetech Model Dew Master S/N. 44602.  
Temperature & Humidity Chamber, PGC Model 9141-5116 S/N. 1304261.

#### TRACEABILITY :

The measurements are traceable to International System of Units (SI), through Thunder Scientific Corporation.  
Certificate No. 21594, Due Date 06 July 2024.

#### UNCERTAINTY :

The reported expanded uncertainty of measurement is stated as the standard uncertainty of measurement multiplied by the coverage factor  $k = 2.00$  which for a normal distribution corresponds to a coverage probability of approximately 95 %.  
It has been evaluated according to the "Evaluation of the Uncertainty of Measurement in Calibration (EA-4/02 M:2022)"

Certificate No. Q24038369

F3-011-05/12-23

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@ckcalibration



CONDITION OF CALIBRATION ITEM : RECEIVED IN GOOD OPERATIONAL CONDITION  
MEASUREMENT RESULTS : ( X ) without adjustment ( ) adjustment

The table in the following gives the calibration results and associated measurement uncertainties of the measuring digital thermohygro meter.

CALIBRATION DATA

1. CORRECTION OF TEMPERATURE

Test point ( ° C )	Actual Temperature ( ° C )	DUC Reading ( ° C )	Correction ( ° C )	Uncertainty ± ( ° C )
20.0	20.00	19.6	+0.40	0.27
25.0	25.00	24.6	+0.40	
30.0	30.00	29.5	+0.50	

2. CORRECTION OF HUMIDITY

STD Temperature ( ° C )	STD Reading ( %RH )	DUC Reading ( %RH )	Correction ( %RH )	Uncertainty ± ( %RH )
25	40.0	32	+8.0	0.8
25	60.0	52	+8.0	0.9

Note. The Scope of Accredited ANAB Certificate No. ACDM-2814 Version 012 Page 59 of 67

This report is valid for the above stated instrument/s only.

### End of Certificate ###

Certificate No. Q24038369

F3-011-05/12-23



CERTIFICATE OF CALIBRATION

FOR

NOMENCLATURE : DIGITAL THERMOHYGRO METER  
MANUFACTURER : DIGICON  
MODEL / TYPE : TH-02A  
SERIAL NO. : 1919E0284980[DTH-02]  
CLID. NO. : 232100201  
JOB CONTROL NO. : 240408038370  
CALIBRATION SERVICE : ☒ IN-LABORATORY ☐ ON-SITE

CUSTOMER : ENVIRONMENTAL MEASUREMENTS CO., LTD.

5/45 BAAN KLANG KRUNG BIZ TOWN, SOI SRINAGARINDRA 46/1 (PRAMOTE),  
NONG BON SUB-DISTRICT, PRAWET DISTRICT, BANGKOK 10250

DATE OF RECEIVED : 08 April 2024

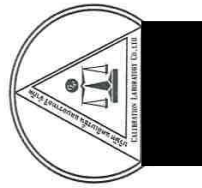
DATE OF ISSUED : 17 April 2024

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Calibrated By :



Approved By :



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Certificate No. Q24038370

F3-011-05/12-23

