

ภาคผนวกที่ 5

เอกสารการสอบเทียบเครื่องมือตรวจวิเคราะห์คุณภาพน้ำทิ้ง

ตารางสรุปรายการเอกสารการสอบเทียบเครื่องมือตรวจวัดคุณภาพสิ่งแวดล้อม

รายการตรวจวัด	เครื่องมือเก็บตัวอย่าง	เครื่องมือตรวจวิเคราะห์
	ชื่อเครื่องมือ	ชื่อเครื่องมือ
คุณภาพน้ำ		
- pH	-	- pH Meter
- BOD ₅	-	- BOD Analyzer
- Total Suspended Solids	-	- Electronic Balance
- Total Dissolved Solids	-	- Electronic Balance
- Settleable Solids	-	- Electronic Balance
- TKN	-	- Kjeldahl Block Digestion
- Sulfide	-	- Electronic Balance
- Grease & Oil	-	- Electronic Balance
- TCB	-	- Incubator
- FCB	-	- Incubator
- Standard plate count	-	- Incubator
- <i>Legionella</i> spp.	-	- Incubator



QUALITY CALIBRATION CO., LTD.
235 Petchkasem 63/2 Road, Laksong, Bangkac, Bangkok 10160
Tel (662) 421-5402, (662) 444-0152-3, Fax (662) 809-4584



CERTIFICATE No : 24E6416
REFERENCE No : 73694-1

PAGE : 1 OF 3

Certificate of Calibration

EQUIPMENT : pH METER
MANUFACTURER : HANNA
MODEL : HI 3512
SERIAL No : TH118035
ID No : pH 04/56
CONDITION AS RECEIVED : USED ITEM
SUBMITTED BY : S.P.S. CONSULTING SERVICE CO., LTD.
7 SOI PHAHOLYOTHIN 24, PHAHOLYOTHIN RD.,
JOMPOL, CHATUCHAK, BANGKOK 10900

CALIBRATED BY : ATSAWIN Y.

CALIBRATION DATE : 27-Jun-24

APPROVED BY : PONGSAK J.

ISSUED DATE : 27-Jun-24

RECEIVED DATE : 24-Jun-24

THIS CERTIFICATE MAY NOT BE REPRODUCED OTHER THAN IN FULL EXCEPT WITH THE PRIOR WRITTEN APPROVAL OF
QUALITY CALIBRATION CO., LTD.



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CERTIFICATE No : 24E6416

PAGE : 2 OF 3

Calibration Report

EQUIPMENT : pH METER
MANUFACTURER : HANNA
ID No : pH 04/56
RECEIVED DATE : 24-Jun-24
AMBIENT TEMPERATURE : 23 °C ± 3 °C
MODEL : HI 3512
SERIAL NUMBER : TH118035
CALIBRATION DATE : 27-Jun-24
RELATIVE HUMIDITY : 50 % RH ± 10% RH

CONDITION OF THIS RESULTS OF CALIBRATION

1. THIS INSTRUMENT WAS CALIBRATED BY DIRECT MEASUREMENT METHOD BASED ON WI-TQ-062 AND WI-TQ-063. THE DISPLAY UNIT WAS TESTED BY GENERATING STANDARD VOLTAGE TO THE UNIT AND READING THE VALUE COMPARED WITH THE CALCULATED VALUE. THE DISPLAY AND ELECTROD WAS CALIBRATED BY USING STANDARD pH BUFFER
2. REFERENCE STANDARD INSTRUMENTS :-

INSTRUMENT	MODEL	SERIAL No/ LOT No	CERTIFICATE No	DUE DATE
1) pH STANDARD SOLUTION	00651-06	CC784945	4880-14413915	24-Aug-25
2) pH STANDARD SOLUTION	00651-08	CC785578	4881-14430633	31-Aug-25
3) pH STANDARD SOLUTION	00651-10	CC787086	4882-14483317	21-Sep-25
4) PROCESS CALIBRATOR	CA150	91S6079	24E1251	09-Apr-25
5) BATH	260014	1247 48074	23T9014	13-Sep-24
6) THERMOMETER WITH PROBE	421504	55000379	23T9623	13-Sep-24

3. THE CERTIFICATE IS VALID FOR THE ITEM CALIBRATED AS SHOWN ON THE DATE AND PLACE OF CALIBRATION ONLY.
4. THIS RESULT EXCLUDE LONG TERM STABILITY OF THE UNIT UNDER CALIBRATION.
5. THIS CERTIFICATE IS TRACEABLE TO SI UNIT MAINTAINED AT :-
 - NATIONAL INSTITUTE OF STANDARD AND TECHNOLOGY, USA.
 - NATIONAL INSTITUTE OF METROLOGY (THAILAND)

RESULT OF CALIBRATION : ADJUSTMENT

1. DISPLAY UNIT ONLY

SLOPE FACTOR $k = 2.303 \text{ RT/F} = 59 \text{ mV/pH}$

mV APPLIED	UUC READING (mV)	CORRECTION (mV)	UUC READING (pH)	UNCERTAINTY OF MEASUREMENT (± mV)	COVERAGE FACTOR k
414.11	414.8	-0.69	-0.115	0.15	2.00
354.95	355.5	-0.55	0.884	0.15	2.00
295.80	296.4	-0.60	1.885	0.15	2.00
236.64	237.1	-0.46	2.886	0.15	2.00
177.48	178.0	-0.52	3.887	0.15	2.00
118.32	118.8	-0.48	4.887	0.15	2.00
59.16	59.6	-0.44	5.887	0.15	2.00
0.00	0.4	-0.40	6.888	0.15	2.00
-59.16	-58.7	-0.46	8.101	0.15	2.00
-118.32	-117.9	-0.42	9.345	0.15	2.00
-177.48	-177.4	-0.08	10.589	0.15	2.00
-236.64	-236.4	-0.24	11.834	0.15	2.00
-295.80	-294.5	-1.30	13.077	0.15	2.00
-354.95	-354.7	-0.25	14.322	0.15	2.00
-414.11	-413.9	-0.21	15.565	0.15	2.00

END OF CALIBRATION REPORT PAGE 2 OF 3



CERTIFICATE No : 24E6416

PAGE : 3 OF 3

Calibration Report

RESULT OF CALIBRATION (CONTINUE) :

2. DISPLAY UNIT WITH pH ELECTRODE S/N: 09081C6M

STANDARD pH BUFFER SOLUTION (pH)	UUC READING (pH)	CORRECTION (pH)	VALUE BEFORE ADJUSTMENT	UNCERTAINTY OF MEASUREMENT (± pH)	COVERAGE FACTOR k
4.015	4.011	0.004	3.905	0.012	2.00
7.003	7.003	0.000	6.972	0.012	2.00
10.009	10.014	-0.005	9.570	0.014	2.00

3. DISPLAY UNIT WITH TEMPERATURE

STANDARD READING (°C)	UUC READING (°C)	CORRECTION (°C)	VALUE BEFORE ADJUSTMENT	UNCERTAINTY OF MEASUREMENT (± °C)	COVERAGE FACTOR k
25.004	25.0	0.004	---	0.0085	2.00

4. PERCENT SLOPE 100%

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 APPROXIMATELY 95%.

END OF CALIBRATION REPORT



CERT.No.: HS-V015C

Calibration Date : 20 Mar 24

Submitted by : ASIA LAB @ CONSULTANT CO.,LTD

184 Soi Phutthamonthon Sai 2 Soi 12,
Bangphai, Bangkai, Bangkok 10160

Avg Room Temp : 20 °C

Avg Water Temp : 20 °C

Air Pressure : 760.00 mmHg

Salinity : 0 ppt

Model : YSI 5000

S/N : 15B100751

Probe : YSI 5010

S/N : 22D100097

ID NO. : -

Air Temp ref : S/N. F8065C26

Barometric ref : S/N. F8065C26

Water Temp ref : S/N. 11430

Technician : Kittipong M.

Calibration Details

Calibration Point	100% air sat. (@20 °C, DO = 9.09 mg/l)	(status)	(status)
Measurement 1 (mg/l)	9.08	(PASS)	-
Measurement 2 (mg/l)	9.08	(PASS)	-
Measurement 3 (mg/l)	9.08	(PASS)	-
Measurement 4 (mg/l)	9.08	(PASS)	-
Measurement 5 (mg/l)	9.08	(PASS)	-
Measurement 6 (mg/l)	9.08	(PASS)	-
Measurement 7 (mg/l)	9.08	(PASS)	-
Measurement 8 (mg/l)	9.08	(PASS)	-
Measurement 9 (mg/l)	9.08	(PASS)	-
Measurement 10 (mg/l)	9.08	(PASS)	-

Mean Measurement	9.08	mg/l	-	-
Inaccuracy	0.01	mg/l	-	-

Overall Status (PASS)

Manufacturer Specification

Accuracy = +/- 0.02 mg/l

- 1) This certificate is issued based on the result that are found as shown on date and place of test only.
- 2) The calibration procedure followed in accordance with Harikul Science Co., Ltd.
- 3) This result shall not be used for advertising purpose.

Technician Signature

(Kittipong Maekwong)

Laboratory Manager

(Supreecha Sumaritam)



CERTIFICATE No : 24M2229
REFERENCE No : 72448-3

PAGE : 1 OF 2

Certificate of Calibration

EQUIPMENT : DIGITAL BALANCE
MANUFACTURER : SARTORIUS
MODEL : BSA224S-CW
SERIAL No : 36591843
ID No : BA 09/61
CONDITION AS RECEIVED : USED ITEM
SUBMITTED BY : S.P.S. CONSULTING SERVICE CO., LTD.
7 SOI PHAHOLYOTHIN 24, PHAHOLYOTHIN RD.,
JOMPOL, CHATUCHAK, BANGKOK 10900

CALIBRATED BY : ATSAWIN Y.

CALIBRATION DATE : 08-Mar-24

APPROVED BY : PONGSAK J.

ISSUED DATE : 14-Mar-24

RECEIVED DATE : 08-Mar-24

THIS CERTIFICATE MAY NOT BE REPRODUCED OTHER THAN IN FULL EXCEPT WITH THE PRIOR WRITTEN APPROVAL OF
QUALITY CALIBRATION CO., LTD.



CERTIFICATE No : 24M2229

PAGE : 2 OF 2

Calibration Report

EQUIPMENT : DIGITAL BALANCE MODEL : BSA224S-CW
MANUFACTURER : SARTORIUS S/N : 36591843
ID No : BA 09/61 RECEIVED DATE : 08-Mar-24
AIR PRESSURE : 1010mbar \pm 1mbar CALIBRATION DATE : 08-Mar-24
AMBIENT TEMPERATURE : 25° C \pm 1° C RELATIVE HUMIDITY : 55 %RH \pm 10 % RH

CONDITION OF THIS RESULTS OF CALIBRATION

1. THIS INSTRUMENT WAS CALIBRATED BY ACCORDING TO UKAS LAB 14 EDITION 6:2019 BY USING KNOWN WEIGHT STANDARD WEIGHT. THE BALANCE WAS NOT ADJUSTED BEFORE CALIBRATION. THE BALANCE HAS NO ZERO TRACKING FUNCTION. REPEATABILITY WAS MEASURED BY USING 10 REPEATED MEASUREMENTS. LINEARITY WAS MEASURED COVERING 10 POINTS, EVENLY SPREAD OVER THE RANGE. THE INSTRUMENT WAS SET ZERO BEFORE PERFORMING THE LINEARITY TEST. OFF-CENTER LOADING WAS MEASURED BY USING STANDARD WEIGHTS PLACED ON THE PAN AND MOVED TO VARIOUS POSITIONS ON THE PAN.

2. REFERENCE STANDARD INSTRUMENTS :-

INSTRUMENT	MODEL	SERIAL No	CERTIFICATE No	DUE DATE
1) STANDARD WEIGHT SET	E2	QK-I-151	M2302013S	02-Feb-25
2) STANDARD WEIGHT	E2	15843	M2302014S	02-Feb-25

3. THE CERTIFICATE IS VALID FOR THE ITEM CALIBRATED AS SHOWN ON THE DATE AND PLACE OF CALIBRATION ONLY.

4. THIS RESULT EXCLUDE LONG TERM STABILITY OF THE UNIT UNDER CALIBRATION.

5. THIS CERTIFICATE IS TRACEABLE TO THE INTERNATIONAL SYSTEM OF UNIT MAINTAINED AT:-
- NATIONAL INSTITUTE OF METROLOGY (THAILAND) THROUGH CENTRAL BUREAU OF WEIGHTS&MEASURES

RESULT OF CALIBRATION :- WITHOUT ADJUSTMENT

1. ZERO SETTING FUNCTION : NORMAL

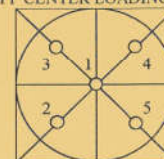
2. TARE FUNCTION : NORMAL

3. REPEATABILITY OF READING AT 200 g WAS 0 g

4. DEPARTURE FROM NOMINAL VALUE/ LINEARITY

NOMINAL VALUE (g)	BALANCE READING (g)	CORRECTION (g)	UNCERTAINTY (\pm g)
0.0	0.0000	0.0000	0.000082
0.1	0.1000	0.0000	0.000083
0.2	0.2000	0.0000	0.000083
0.5	0.5000	0.0000	0.000083
1.0	1.0000	0.0000	0.000084
2.0	2.0000	0.0000	0.000084
5.0	5.0000	0.0000	0.000086
10.0	10.0000	0.0000	0.000089
20.0	20.0001	-0.0001	0.000094
50.0	50.0000	0.0000	0.00012
100.0	100.0001	-0.0001	0.00019
200.0	200.0000	0.0000	0.00032

5. OFF CENTER LOADING ERROR



POINT	READING (g)
1	100.0000
2	100.0000
3	100.0000
4	100.0000
5	100.0000
OFF-CENTER LOADING	0.0000

NOTE: THIS CALIBRATION WAS CARRIED OUT AT THE CUSTOMER'S PLACE AT LABORATORY AREA
THE REPORTED UNCERTAINTY OF MEASUREMENT WAS BASED ON A STANDARD UNCERTAINTY MULTIPLIED BY A
COVERAGE FACTOR $k=2$, PROVIDING A LEVEL OF CONFIDENCE APPROXIMATELY 95%.

END OF CALIBRATION REPORT



MIRACLE INTERNATIONAL TECHNOLOGY CO.,LTD

214 Bangwaek Rd. Bangpai Bangkae Bangkok 10160
Tel.: 0-2865-4647-8 Fax: 0-2865-4649 http://www.mit.in.th



CALIBRATION CERTIFICATE

Certificate No. : L202307315-0001

Date Issued : 04-Aug-23

Customer : S.P.S. CONSULTING SERVICE CO., LTD.
7 Soi Phaholyothin 24 Phaholyothin Road., Jompol, Chatuchak,
Bangkok 10900

Equipment : Block Digestion (Gerhardt, TR)

Manufacturer : Gerhardt

Model : -

Serial No. : 4061832

ID No./Tag No. : KJ 01/43

Date Received : 27-Jul-23

Date Calibrated : 02-Aug-23

Calibrated by : Mr. Jame Khaothong

Calibration Method or Calibration Procedure Used

In-house method : CP-49 base on TLAS G-20 by comparing against Standard Thermometer.

This certificate is traceable to national standards, which realize the units of measurement according to the International System of Units (SI).

Result of Calibration

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

This certificate may not be reproduced other than in full except with the prior written approval of the Miracle International Technology Company Limited.

Approved by:

Sarayuth T.

(Mr. Sarayuth Tochua)



Page 1 of 2

Certificate No. : L202307315-0001

Environment : Ambient Temperature : $(25 \pm 2)^{\circ}\text{C}$

Relative Humidity : $(50 \pm 15)\%\text{RH}$

Calibration Temperature ($^{\circ}\text{C}$)	Setting Temperature ($^{\circ}\text{C}$)	Indicating Temperature ($^{\circ}\text{C}$)	Measured Stability ¹ ($^{\circ}\text{C}$)	Measured Uniformity ² ($^{\circ}\text{C}$)	Overall Variation ³ ($^{\circ}\text{C}$)
380	380	380	0.68	2.44	4.24

Calibration Temperature ($^{\circ}\text{C}$)	Standard Reading ($^{\circ}\text{C}$), Probe No. 20 is Reference Probe					Uncertainty ⁴ ($\pm^{\circ}\text{C}$)
380	No. 1	No. 2	No. 3	No. 4	No. 5	1.7
	378.41	378.85	377.25	377.79	378.29	
	No. 6	No. 7	No. 8	No. 9	No. 10	
	378.27	377.21	377.76	379.64	379.54	
	No. 11	No. 12	No. 13	No. 14	No. 15	
380	378.18	379.62	378.53	379.15	378.98	1.7
	No. 16	No. 17	No. 18	No. 19	No. 20	
	379.59	378.98	380.28	378.60	378.43	

Without adjustment

No.1	No.6	No.11	No.16
No.2	No.7	No.12	No.17
No.3	No.8	No.13	No.18
No.4	No.9	No.14	No.19
No.5	No.10	No.15	No.20

Top view position

Condition As-Received : Used Item

The measurement results and statements of conformity with specification only relate to the item calibrated.

Measurement Standards Used & Traceability :

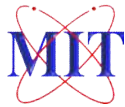
The International System of Units (SI) through

MIT Certificate No. L202302323-002 for Digital Thermometer with Probe (Agilent) Module 2 (172) Type K Serial No. US37011204, Due 09-Sep-23

- Notes :
1. The temperature stability is the one-half of greatest maximum difference of measured temperatures at any one probe.
 2. The temperature uniformity is the maximum difference of measured temperatures between of any probes and the measured temperature at the reference location which are observed at same time.
 3. Overall variation is the difference of maximum and minimum measured temperatures throughout observation time.
 4. The uncertainty of measurement is included temperature stability.

End of Certificate

Page 2 of 2



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Tel.: 0-2865-4647-8 Fax: 0-2865-4649 http://www.mit.in.th



CALIBRATION CERTIFICATE

Certificate No. : L202407024-0001

Date Issued : 31-Jul-24

Customer : S.P.S. CONSULTING SERVICE CO., LTD.
7 Soi Phaholyothin 24 Phaholyothin Road., Jompol, Chatuchak, Bangkok
10900

Equipment : Block Digestion (Gerhardt, TR)

Manufacturer : Gerhardt

Model : -

Serial No. : 4061832

ID No./Tag No. : KJ 01/43

Date Received : 18-Jul-24

Date Calibrated : 30-Jul-24

Calibrated by : Surat Aumarb

Calibration Method or Calibration Procedure Used

In-house method : CP-49 base on TLAS G-20 by comparing against Standard Thermometer.

This certificate is traceable to national standards, which realize the units of measurement according to the International System of Units (SI).

Result of Calibration

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

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Approved by:

Sarayuth T.
(Sarayuth Tochua)



Page 1 of 2

Certificate No. : L202407024-0001

Environment : Ambient Temperature : Start record 26.8 °C, Stop record 26.9 °C
Relative Humidity : Start record 54.4 %RH, Stop record 57.1 %RH

Calibration Temperature (°C)	Setting Temperature (°C)	Indicating Temperature (°C)	Measured Stability ¹ (°C)	Measured Uniformity ² (°C)	Overall Variation ³ (°C)
380	380	380	1.34	2.28	3.27

Calibration Temperature (°C)	Standard Reading (°C), Probe No. 20 is Reference Probe					Uncertainty ⁴ (±°C)
380	No. 1	No. 2	No. 3	No. 4	No. 5	2.2
	380.07	379.54	380.96	379.66	379.31	
	No. 6	No. 7	No. 8	No. 9	No. 10	
	380.63	380.22	379.71	380.41	380.72	
	No. 11	No. 12	No. 13	No. 14	No. 15	
	380.40	380.28	380.03	379.69	380.47	
380	No. 16	No. 17	No. 18	No. 19	No. 20	2.2
	380.11	379.97	379.93	379.81	379.58	

Decision Rule with Guard Band

Calibration Temperature (°C)	Pass / Fail					MPE (±°C)
380	No. 1	No. 2	No. 3	No. 4	No. 5	5
	Pass	Pass	Pass	Pass	Pass	
	No. 6	No. 7	No. 8	No. 9	No. 10	
	Pass	Pass	Pass	Pass	Pass	
	No. 11	No. 12	No. 13	No. 14	No. 15	
	Pass	Pass	Pass	Pass	Pass	
380	No. 16	No. 17	No. 18	No. 19	No. 20	5
	Pass	Pass	Pass	Pass	Pass	

Pass = $|\text{error}| \leq |\text{MPE}|$ MPE = Maximum Permissible Error

Fail = $|\text{error}| > |\text{MPE}|$

Without adjustment

No.1	No.2	No.3	No.4
No.5	No.6	No.7	No.8
No.9	No.10	No.11	No.12
No.13	No.14	No.15	No.16
No.17	No.18	No.19	No.20

Top view position

Condition As-Received : Used Item

The measurement results and statements of conformity with specification only relate to the item calibrated.

Measurement Standards Used & Traceability :

The International System of Units (SI) through

MIT Certificate No. L202403007-0003 for Digital Thermometer with Probe (Agilent) Module 2 (172) Type K Serial No. US37011204, Due 10-Sep-24

- Notes :
1. The temperature stability is the one-half of greatest maximum difference of measured temperatures at any one probe.
 2. The temperature uniformity is the maximum difference of measured temperatures between of any probes and the measured temperature at the reference location which are observed at same time.
 3. Overall variation is the difference of maximum and minimum measured temperatures throughout observation time.
 4. The uncertainty of measurement is included temperature stability.

End of Certificate



CALIBRATION CERTIFICATE

Certificate No. : S2023090437-0003

Date Issued : 28-Sep-23

Customer : S.P.S. CONSULTING SERVICE CO., LTD.
7 Soi Phaholyothin 24 Phaholyothin Road., Jompol, Chatuchak,
Bangkok 10900

Equipment : Incubator

Manufacturer : BINDER

Model : BD 115

Serial No. : 12-16967

ID No./Tag No. : IN 05/56

Date Received : 22-Sep-23

Date Calibrated : 22-Sep-23

Calibrated by : Mr. Jame Khaothong

Calibration Method or Calibration Procedure Used

Standard method : CP-05 TLAS G-20.

This certificate is traceable to national standards, which realize the units of measurement according to the International System of Units (SI).

Result of Calibration

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

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Approved by: *Sarayuth T.*
(Mr. Sarayuth Tochua)



Page 1 of 2

Certificate No. : S2023090437-0003

Environment : Ambient Temperature : Start record 24.3 °C, Stop record 24.5 °C
Relative Humidity : Start record 54.8 %RH, Stop record 54.6 %RH

Calibration Temperature (°C)	Setting Temperature (°C)	Indicating Temperature (°C)	Measured Stability ¹ (°C)	Measured Uniformity ² (°C)	Overall Variation ³ (°C)
35	35.0	35.0	0.08	0.17	0.31
41.5	41.5	41.5	0.04	0.18	0.25

Without adjustment

Calibration Temperature (°C)	STD No. 1 (°C)	STD No. 2 (°C)	STD No. 3 (°C)	STD No. 4 (°C)	STD No. 5 (°C)	STD No. 6 (°C)	STD No. 7 (°C)	STD No. 8 (°C)	STD No. 9 (°C)	Uncertainty ⁴ (°C)
35	34.83	34.85	34.97	34.82	34.84	34.95	34.90	34.80	34.93	0.23
41.5	41.36	41.38	41.46	41.32	41.28	41.48	41.40	41.33	41.44	0.23

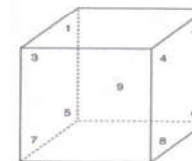
Calibration Temperature (°C)	MPE (±°C)	Pass / Fail with Guard Band								
		No. 1 (°C)	No. 2 (°C)	No. 3 (°C)	No. 4 (°C)	No. 5 (°C)	No. 6 (°C)	No. 7 (°C)	No. 8 (°C)	No. 9 (°C)
35.00	0.5	Pass	Pass	Pass	Pass	Pass	Pass	Pass	Pass	Pass
41.50	0.5	Pass	Pass	Pass	Pass	Pass	Pass	Pass	Pass	Pass

Pass = $|\text{error}| + |\text{uncertainty}| \leq |\text{MPE}|$

Fail = $|\text{error}| + |\text{uncertainty}| > |\text{MPE}|$

Note : Probe No. 9 is Reference Probe

Setting Air Fresh No. 0



Condition As-Received : Used Item

The measurement results and statements of conformity with specification only relate to the item calibrated.

Measurement Standards Used & Traceability :

The International System of Units (SI) through

MIT Certificate No. L202306247-001 for Data Acquisition STD-286 Module 1 Serial No. MY44023139, Due 24-Dec-23

Notes : 1. The temperature stability is the one-half of greatest maximum difference of measured temperatures at any one probe.

2. The temperature uniformity is the maximum difference of measured temperatures between of any probes and the measured temperature at the reference location which are observed at same time.

3. Overall variation is the difference of maximum and minimum measured temperatures throughout observation time.

4. The uncertainty of measurement is included temperature stability.

5. The temperature uniformity, stability, overall variation and indicating temperature is applicable to all air or gas filled temperature controlled enclosures at atmospheric pressure.

End of Certificate

Page 2 of 2



MIRACLE INTERNATIONAL TECHNOLOGY CO.,LTD
214 Bangwaek Rd. Bangpai Bangkae Bangkok 10160
Tel.: 0-2865-4647-8 Fax: 0-2865-4649 http://www.mit.in.th



CALIBRATION CERTIFICATE

Certificate No. : S2024090374-0003

Date Issued : 23-Sep-24

Customer : S.P.S. CONSULTING SERVICE CO., LTD.
7 Soi Phaholyothin 24 Phaholyothin Road., Jompol, Chatuchak, Bangkok 10900

Equipment : Incubator

Manufacturer : BINDER

Model : BD 115

Serial No. : 12-16967

ID No./Tag No. : IN 05/56

Date Received : 16-Sep-24

Date Calibrated : 16-Sep-24

Calibrated by : Anusak Songliam

Calibration Method or Calibration Procedure Used

Standard method : CP-05 TLAS G-20.

This certificate is traceable to national standards, which realize the units of measurement according to the International System of Units (SI).

Result of Calibration

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

This certificate may not be reproduced other than in full except with the prior written approval of the Miracle International Technology Company Limited.

Approved by:

Sarayuth T.
(Sarayuth Tochua)



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Certificate No. : S2024090374-0003

Environment : Ambient Temperature : Start record 23.7 °C, Stop record 23.5 °C
Relative Humidity : Start record 54.6 %RH, Stop record 54.4 %RH

Calibration Temperature (°C)	Setting Temperature (°C)	Indicating Temperature (°C)	Measured Stability ¹ (°C)	Measured Uniformity ² (°C)	Overall Variation ³ (°C)
35	35.0	35.0	0.04	0.21	0.38
41.5	41.5	41.5	0.07	0.19	0.30

Without adjustment

Calibration Temperature (°C)	STD No. 1 (°C)	STD No. 2 (°C)	STD No. 3 (°C)	STD No. 4 (°C)	STD No. 5 (°C)	STD No. 6 (°C)	STD No. 7 (°C)	STD No. 8 (°C)	STD No. 9 (°C)	Uncertainty ⁴ (±°C)
35	34.81	35.12	34.93	34.92	35.02	34.82	34.92	35.13	34.98	0.23
41.5	41.31	41.49	41.33	41.34	41.41	41.31	41.52	41.32	41.46	0.23

Decision Rule with Guard Band

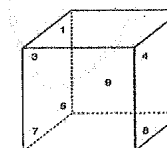
Calibration Temperature (°C)	No. 1	No. 2	No. 3	No. 4	No. 5	No. 6	No. 7	No. 8	No. 9	MPE (±°C)
35	Pass	Pass	Pass	Pass	Pass	Pass	Pass	Pass	Pass	0.5
41.5	Pass	Pass	Pass	Pass	Pass	Pass	Pass	Pass	Pass	0.5

Pass = $|\text{error}| + |\text{uncertainty}| \leq |\text{MPE}|$ MPE = Maximum Permissible Error

Fail = $|\text{error}| + |\text{uncertainty}| > |\text{MPE}|$

Note : Probe No. 9 is Reference Probe

Setting Air Fresh No. 0



Condition As-Received : Used Item

The measurement results and statements of conformity with specification only relate to the item calibrated.

Measurement Standards Used & Traceability :

The International System of Units (SI) through

MIT Certificate No. L202407373-0005 for Temperature Indicator with Sensor Serial No. US37020317, Due 31-Jan-25

- Notes :
1. The temperature stability is the one-half of greatest maximum difference of measured temperatures at any one probe.
 2. The temperature uniformity is the maximum difference of measured temperatures between of any probes and the measured temperature at the reference location which are observed at same time.
 3. Overall variation is the difference of maximum and minimum measured temperatures throughout observation time.
 4. The uncertainty of measurement is included temperature stability.
 5. The temperature uniformity, stability, overall variation and indicating temperature is applicable to all air or gas filled temperature controlled enclosures at atmospheric pressure.

End of Certificate

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