

ระดับความร้อนในสถานประกอบการ



ID LINE : IEC17025



Certificate of Calibration

Certificate Number : SPR24030285-9

Page : 1 of 3

Customer : S.P.S. CONSULTING SERVICE CO., LTD.

7 Soi Phaholyothin 24 Phaholyothin Road., Jompol, Chatuchak,
Bangkok 10900

Equipment Name : Area Heat Stress Monitor

Manufacturer : Quest Technologies

Model : QUESTemp 34

Serial Number : TEH060047

ID. Number : B5

Environmental Conditions

Ambient Temperature : $23^{\circ}\text{C} \pm 2^{\circ}\text{C}$

Received Date : 19 Mar 2024

Relative Humidity : $50\% \pm 15\%$

Calibration Date : 22 Mar 2024

Location of Calibration : In-Lab

Recommend Due Date : 22 Mar 2025

Calibration Procedure : SP-CPT-04-13

Date of Issue : 23 Mar 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 : Mr. Navaporn Uengseng

Calibration Officer

Approved by :

(Mr. Prayoon Topart)

Authorized Signatory



ID LINE : IEC17025



Calibration Report

Certificate Number : SPR24030285-9

Page : 2 of 3

Reference Standards

Equipment Name	Model	Serial No.	Certificate No.	Due. Date
Humidity Chamber	TH-80S	N/A	SPR24020149-7	23 Feb 2025
THERMO-HYGROMETER	5020A	A47046	QR24-0167	26 Jan 2025

Traceability

This certification is traceable to the International System of Unit maintained at :

SP Metrology - SP Metrology system (Thailand) Co.Ltd.

Quality Reborn Co., Ltd



ID LINE : IEC17025



Result of Calibration

Certificate No. : SPR24030285-9

Page : 3 of 3

Temperature Accuracy in the Measurement. (WET)

Unit : °C

Temperature Setting	Standard Reading	UUC Reading	Error	Uncertainty (±)
30.0	30.010	29.8	-0.210	0.20
35.0	35.012	34.8	-0.212	0.20
40.0	40.014	39.7	-0.314	0.20

Temperature Accuracy in the Measurement. (DRY)

Unit : °C

Temperature Setting	Standard Reading	UUC Reading	Error	Uncertainty (±)
30.0	30.010	29.8	-0.210	0.20
35.0	35.012	34.8	-0.212	0.20
40.0	40.014	39.7	-0.314	0.20

Temperature Accuracy in the Measurement. (GLOBE)

Unit : °C

Humidity Setting	Standard Reading	UUC Reading	Error	Uncertainty (±)
30.0	30.010	29.8	-0.210	0.20
35.0	35.012	34.8	-0.212	0.20
40.0	40.014	39.7	-0.314	0.20

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 -



บริษัท เอส.พี.เอส. คอนซัลติ้ง เซอร์วิส จำกัด
S.P.S. CONSULTING SERVICE CO., LTD.
7 ซอยพหลโยธิน 24 ถนนพหลโยธิน แขวงจอมพล เขตจตุจักร กรุงเทพฯ 10900
7 Soi Phaholyothin 24, Phaholyothin Rd., Jompol, Chatuchak, Bangkok 10900
Tel : (662) 939-4370-72. Fax : (662) 513-4221. E-mail : sale@spscon.com., www.spscon.com

Heat 123_1

Heat Stress WBGT Meter Verification Report			
Verification Data			
Heat Stress WBGT Meter No.	: B05	Verification Date	: 21 April 2024
Brand	: Quest Technologies	Ambient Temp.	: 24.5 °C
Model	: QUESTemp 34	Barometric Pressure	: 1011 mmbar
Serial No.	: TEH060047	Relative Humidity	: 49 %
Verification Module (Electronic Sensor Check) :			
Verification Module No. : 21 WB = 12.5 °C, DB = 47.1 °C, G = 69.3 °C			
Result of Verification : Without Adjustment			
Wet Probe Temperature Measurement			
Verification Module Reading (°C)	UUC* Reading (°C)	Correction (°C)	Tolerance Limit (°C)
12.5	12.7	-0.2	± 0.5
Dry Probe Temperature Measurement			
Verification Module Reading (°C)	UUC* Reading (°C)	Correction (°C)	Tolerance Limit (°C)
47.1	47.0	0.1	± 0.5
Globe Probe Temperature Measurement			
Verification Module Reading (°C)	UUC* Reading (°C)	Correction (°C)	Tolerance Limit (°C)
69.3	69.1	0.2	± 0.5
UUC* = UNIT UNDER CALIBRATION			

Verified by :

(Mr.Adul Dangklom)

Approved by :

(Mr. Peera Detudom)



Certificate of Calibration

Certificate Number : SPR23110050-1

Page : 1 of 3

Customer : S.P.S. CONSULTING SERVICE CO., LTD.

7 Soi Phaholyothin 24 Phaholyothin Road., Jompol, Chatuchak,
Bangkok 10900

Equipment Name : Area Heat Stress Monitor

Manufacturer : Quest Technologies

Model : QUESTemp 32

Serial Number : TPA100010

ID. Number : B12

Environmental Conditions

Ambient Temperature : $23\text{ }^{\circ}\text{C} \pm 2\text{ }^{\circ}\text{C}$

Received Date : 03 Nov 2023

Relative Humidity : $50\% \pm 15\%$

Calibration Date : 03 Nov 2023

Location of Calibration : In-Lab

Recommend Due Date : 03 Nov 2024

Calibration Procedure : SP-CPT-04-13

Date of Issue : 04 Nov 2023

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 : Mr.Pitak Srisutam

Calibration Officer

Approved by :



(Mr.Prayoon Topart)

Authorized Signatory



Calibration Report

Certificate Number : SPR23110050-1

Page : 2 of 3

Reference Standards

Equipment Name	Model	Serial No.	Certificate No.	Due. Date
Humidity Chamber	TH-80S	N/A	SPR23010480-5	22 Feb 2024
THERMO-HYGROMETER	5020A	A47046	QR23-0176	26 Jan 2024

Traceability

This certification is traceable to the International System of Unit maintained at :

SP Metrology - SP Metrology system (Thailand) Co.Ltd.

Quality Reborn Co., Ltd



Result of Calibration

Certificate No. : SPR23110050-1

Page : 3 of 3

Temperature Accuracy in the Measurement. (WET)

Unit : °C

Temperature Setting	Standard Reading	UUC Reading	Error	Uncertainty (±)
30.0	30.014	30.1	0.086	0.20
35.0	35.012	35.1	0.088	0.20
40.0	40.017	40.1	0.083	0.20

Temperature Accuracy in the Measurement. (DRY)

Unit : °C

Temperature Setting	Standard Reading	UUC Reading	Error	Uncertainty (±)
30.0	30.014	30.2	0.186	0.20
35.0	35.012	35.2	0.188	0.20
40.0	40.017	40.2	0.183	0.20

Temperature Accuracy in the Measurement. (GLOBE)

Unit : °C

Humidity Setting	Standard Reading	UUC Reading	Error	Uncertainty (±)
30.0	30.014	30.2	0.186	0.20
35.0	35.012	35.2	0.188	0.20
40.0	40.017	40.2	0.183	0.20

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 –



บริษัท เอส.พี.เอส. คอนซัลติ้ง เซอร์วิส จำกัด
S.P.S. CONSULTING SERVICE CO., LTD.
7 ซอยพหลโยธิน 24 ถนนพหลโยธิน แขวงจอมพล เขตจตุจักร กรุงเทพฯ 10900
7 Soi Phaholyothin 24, Phaholyothin Rd., Jompol, Chatuchak, Bangkok 10900
Tel : (662) 939-4370-72. Fax : (662) 513-4221, E-mail : sale@spscn.com., www.spscn.com

Heat 123_2

Heat Stress WBGT Meter Verification Report			
Verification Data			
Heat Stress WBGT Meter No.	: B12	Verification Date	: 21 April 2024
Brand	: Quest Technologies	Ambient Temp.	: 24.5 °C
Model	: QUESTemp 32	Barometric Pressure	: 1011 mmbar
Serial No.	: TPA100010	Relative Humidity	: 49 %
Verification Module (Electronic Sensor Check) :			
Verification Module No. : 21 WB = 12.5 °C, DB = 47.1 °C, G = 69.3 °C			
Result of Verification : Without Adjustment			
Wet Probe Temperature Measurement			
Verification Module Reading (°C)	UUC* Reading (°C)	Correction (°C)	Tolerance Limit (°C)
12.5	12.7	-0.2	± 0.5
Dry Probe Temperature Measurement			
Verification Module Reading (°C)	UUC* Reading (°C)	Correction (°C)	Tolerance Limit (°C)
47.1	47.0	0.1	± 0.5
Globe Probe Temperature Measurement			
Verification Module Reading (°C)	UUC* Reading (°C)	Correction (°C)	Tolerance Limit (°C)
69.3	69.4	-0.1	± 0.5
UUC* = UNIT UNDER CALIBRATION			

Verified by :

[Redacted Signature]

(Mr.Adul Dangklom)

Approved by :

[Redacted Signature]

(Mr. Peera Detudom)



Certificate of Calibration

Certificate Number : SPR23110050-2

Page : 1 of 3

Customer : S.P.S. CONSULTING SERVICE CO., LTD.

7 Soi Phaholyothin 24 Phaholyothin Road., Jompol, Chatuchak,
Bangkok 10900

Equipment Name : Area Heat Stress Monitor

Manufacturer : Quest Technologies

Model : QUESTemp 34

Serial Number : TEF050029

ID. Number : B17

Environmental Conditions

Ambient Temperature : $23\text{ }^{\circ}\text{C} \pm 2\text{ }^{\circ}\text{C}$

Received Date : 03 Nov 2023

Relative Humidity : $50\% \pm 15\%$

Calibration Date : 03 Nov 2023

Location of Calibration : In-Lab

Recommend Due Date : 03 Nov 2024

Calibration Procedure : SP-CPT-04-13

Date of Issue : 04 Nov 2023

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).

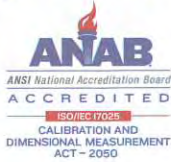
Calibrated by : Mr.Pitak Srisutam

Calibration Officer

Approved by :


(Mr.Prayoon Topart)

Authorized Signatory



Calibration Report

Certificate Number : SPR23110050-2

Page :2 of 3

Reference Standards

Equipment Name	Model	Serial No.	Certificate No.	Due. Date
Humidity Chamber	TH-80S	N/A	SPR23010480-5	22 Feb 2024
THERMO-HYGROMETER	5020A	A47046	QR23-0176	26 Jan 2024

Traceability

This certification is traceable to the International System of Unit maintained at :

SP Metrology - SP Metrology system (Thailand) Co.Ltd.

Quality Reborn Co., Ltd



Result of Calibration

Certificate No. : SPR23110050-2

Page : 3 of 3

Temperature Accuracy in the Measurement. (WET)

Unit : °C

Temperature Setting	Standard Reading	UUC Reading	Error	Uncertainty (±)
30.0	30.014	30.3	0.286	0.20
35.0	35.012	35.3	0.288	0.20
40.0	40.017	40.3	0.283	0.20

Temperature Accuracy in the Measurement. (DRY)

Unit : °C

Temperature Setting	Standard Reading	UUC Reading	Error	Uncertainty (±)
30.0	30.014	30.2	0.186	0.20
35.0	35.012	35.2	0.188	0.20
40.0	40.017	40.2	0.183	0.20

Temperature Accuracy in the Measurement. (GLOBE)

Unit : °C

Humidity Setting	Standard Reading	UUC Reading	Error	Uncertainty (±)
30.0	30.014	30.2	0.186	0.20
35.0	35.012	35.2	0.188	0.20
40.0	40.017	40.2	0.183	0.20

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 -



บริษัท เอส.พี.เอส. คอนซัลติ้ง เซอร์วิส จำกัด
S.P.S. CONSULTING SERVICE CO., LTD.
7 ซอยพหลโยธิน 24 ถนนพหลโยธิน แขวงจอมพล เขตจตุจักร กรุงเทพฯ 10900
7 Soi Phaholyothin 24, Phaholyothin Rd., Jompol, Chatuchak, Bangkok 10900
Tel : (662) 939-4370-72. Fax : (662) 513-4221, E-mail : sale@spscon.com., www.spscon.com

Heat 123_3

Heat Stress WBGT Meter Verification Report			
Verification Data			
Heat Stress WBGT Meter No.	: B17	Verification Date	: 21 April 2024
Brand	: Quest Technologies	Ambient Temp.	: 24.5 °C
Model	: QUESTemp 34	Barometric Pressure	: 1011 mmbar
Serial No.	: TEF050029	Relative Humidity	: 49 %
Verification Module (Electronic Sensor Check) :			
Verification Module No. : 21 WB = 12.5 °C, DB = 47.1 °C, G = 69.3 °C			
Result of Verification : Without Adjustment			
Wet Probe Temperature Measurement			
Verification Module Reading (°C)	UUC* Reading (°C)	Correction (°C)	Tolerance Limit (°C)
12.5	12.4	0.1	± 0.5
Dry Probe Temperature Measurement			
Verification Module Reading (°C)	UUC* Reading (°C)	Correction (°C)	Tolerance Limit (°C)
47.1	47.2	-0.1	± 0.5
Globe Probe Temperature Measurement			
Verification Module Reading (°C)	UUC* Reading (°C)	Correction (°C)	Tolerance Limit (°C)
69.3	69.2	0.1	± 0.5
UUC* = UNIT UNDER CALIBRATION			

Verified by :



(Mr. Adul Dangklom)

Approved by :



(Mr. Peera Detudom)



Certificate of Calibration

Certificate Number : SPR23030505-2

Page : 1 of 3

Customer : S.P.S. CONSULTING SERVICE CO., LTD.

7 Soi Phaholyothin 24 Phaholyothin Road., Jompol, Chatuchak,
Bangkok 10900

Equipment Name : Area Heat Stress Monitor

Manufacturer : Metrosonics

Model : hs-32

Serial Number : MCE030011

ID. Number : B21

Environmental Conditions

Ambient Temperature : $23^{\circ}\text{C} \pm 2^{\circ}\text{C}$

Received Date : 30 Mar 2023

Relative Humidity : $50\% \pm 15\%$

Calibration Date : 31 Mar 2023

Location of Calibration : In-Lab

Recommend Due Date : 31 Mar 2024

Calibration Procedure : SP-CPT-04-13

Date of Issue : 01 Apr 2023

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.

All calibrations are performed within manufacture's specifications. The calibration certificate shall not be reproduced except in full, without written approval of SP Metrology System (Thailand).

Calibrated by : Mr. Sarawut Khitmai

Approved by :

Calibration Officer

(Mr. Nirut Loha)

Authorized Signatory



Calibration Report

Certificate Number : SPR23030505-2

Page : 2 of 3

Reference Standards

Equipment Name	Model	Serial No.	Certificate No.	Due. Date
Humidity Chamber	TH-80S	N/A	SPR23010480-5	22 Feb 2024
THERMO-HYGROMETER	5020A	A47046	QR23-0176	26 Jan 2024

Traceability

This certification is traceable to the International System of Unit maintained at :

SP Metrology - SP Metrology system (Thailand) Co.Ltd.

Quality Reborn Co., Ltd



Result of Calibration

Certificate No. : SPR23030505-2

Page : 3 of 3

Temperature Accuracy in the Measurement. (WET)

Unit : °C

Temperature Setting	Standard Reading	UUC Reading	Error	Uncertainty (±)
30.0	30.013	30.4	0.387	0.50
35.0	35.010	35.4	0.390	0.50
40.0	40.015	40.4	0.385	0.50

Temperature Accuracy in the Measurement. (DRY)

Unit : °C

Temperature Setting	Standard Reading	UUC Reading	Error	Uncertainty (±)
30.0	30.013	30.5	0.487	0.50
35.0	35.010	35.5	0.490	0.50
40.0	40.015	40.5	0.485	0.50

Temperature Accuracy in the Measurement. (GLOBE)

Unit : °C

Temperature Setting	Standard Reading	UUC Reading	Error	Uncertainty (±)
30.0	30.013	30.4	0.387	0.50
35.0	35.010	35.4	0.390	0.50
40.0	40.015	40.4	0.385	0.50

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 –



บริษัท เอส.พี.เอส. คอนซัลติ้ง เซอร์วิส จำกัด
S.P.S. CONSULTING SERVICE CO., LTD.
7 ซอยพหลโยธิน 24 ถนนพหลโยธิน แขวงจอมพล เขตจตุจักร กรุงเทพฯ 10900
7 Soi Phaholyothin 24, Phaholyothin Rd., Jompol, Chatuchak, Bangkok 10900
Tel : (662) 939-4370-72 Fax : (662) 513-4221 E-mail : sale@spscon.com, www.spscon.com

Heat 047_1

Heat Stress WBGT Meter Verification Report			
Verification Data			
Heat Stress WBGT Meter No.	: B21	Verification Date	: 17 February 2024
Brand	: Metrosonics	Ambient Temp.	: 24.5 °C
Model	: hs-32	Barometric Pressure	: 1011 mmbar
Serial No.	: MCE030011	Relative Humidity	: 49 %
Verification Module (Electronic Sensor Check) :			
Verification Module No. : 21 WB = 12.5 °C, DB = 47.1 °C, G = 69.3 °C			
Result of Verification : Without Adjustment			
Wet Probe Temperature Measurement			
Verification Module Reading (°C)	UUC* Reading (°C)	Correction (°C)	Tolerance Limit (°C)
12.5	12.5	0.0	± 0.5
Dry Probe Temperature Measurement			
Verification Module Reading (°C)	UUC* Reading (°C)	Correction (°C)	Tolerance Limit (°C)
47.1	47.2	-0.1	± 0.5
Globe Probe Temperature Measurement			
Verification Module Reading (°C)	UUC* Reading (°C)	Correction (°C)	Tolerance Limit (°C)
69.3	69.1	0.2	± 0.5
UUC* = UNIT UNDER CALIBRATION			

Verified by :

(Mr.Adul Dangklom)

Approved by :

(Mr. Peera Detudom)



Certificate of Calibration

Certificate Number : SPR23110155-6

Page : 1 of 3

Customer : S.P.S. CONSULTING SERVICE CO., LTD.

7 Soi Phaholyothin 24 Phaholyothin Road., Jompol, Chatuchak,
Bangkok 10900

Equipment Name : Area Heat Stress Monitor

Manufacturer : Quest Technologies

Model : QUESTemp 32

Serial Number : TPH050046

ID. Number : B28

Environmental Conditions

Ambient Temperature : $23^{\circ}\text{C} \pm 2^{\circ}\text{C}$

Received Date : 10 Nov 2023

Relative Humidity : $50\% \pm 15\%$

Calibration Date : 11 Nov 2023

Location of Calibration : In-Lab

Recommend Due Date : 11 Nov 2024

Calibration Procedure : SP-CPT-04-13

Date of Issue : 12 Nov 2023

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 : Mr. Navaporn Uengseng

Calibration Officer

Approved by :



(Mr. Sombut Srikampa)

Authorized Signatory



Calibration Report

Certificate Number : SPR23110155-6

Page : 2 of 3

Reference Standards

Equipment Name	Model	Serial No.	Certificate No.	Due. Date
Humidity Chamber	TH-80S	N/A	SPR23010480-5	22 Feb 2024
THERMO-HYGROMETER	5020A	A47046	QR23-0176	26 Jan 2024

Traceability

This certification is traceable to the International System of Unit maintained at :

SP Metrology - SP Metrology system (Thailand) Co.Ltd.

Quality Reborn Co., Ltd



Result of Calibration

Certificate No. : SPR23110155-6

Page : 3 of 3

Temperature Accuracy in the Measurement. (WET)

Unit : °C

Temperature Setting	Standard Reading	UUC Reading	Error	Uncertainty (±)
30.0	30.011	30.3	0.289	0.20
35.0	35.014	35.3	0.286	0.20
40.0	40.017	40.3	0.283	0.20

Temperature Accuracy in the Measurement. (DRY)

Unit : °C

Temperature Setting	Standard Reading	UUC Reading	Error	Uncertainty (±)
30.0	30.011	30.3	0.289	0.20
35.0	35.014	35.3	0.286	0.20
40.0	40.017	40.3	0.283	0.20

Temperature Accuracy in the Measurement. (GLOBE)

Unit : °C

Humidity Setting	Standard Reading	UUC Reading	Error	Uncertainty (±)
30.0	30.011	30.5	0.489	0.20
35.0	35.014	35.5	0.486	0.20
40.0	40.017	40.5	0.483	0.20

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 –



บริษัท เอส.พี.เอส. คอนซัลติ้ง เซอร์วิส จำกัด
S.P.S. CONSULTING SERVICE CO., LTD.
7 ซอยพหลโยธิน 24 ถนนพหลโยธิน แขวงจอมพล เขตจตุจักร กรุงเทพฯ 10900
7 Soi Phaholyothin 24, Phaholyothin Rd., Jompol, Chatuchak, Bangkok 10900
Tel : (662) 939-4370-72, Fax : (662) 513-4221, E-mail : sale@spscon.com., www.spscon.com

Heat 047_2

Heat Stress WBGT Meter Verification Report			
Verification Data			
Heat Stress WBGT Meter No.	: B28	Verification Date	: 17 February 2024
Brand	: Quest Technologies	Ambient Temp.	: 24.5 °C
Model	: QUESTemp 32	Barometric Pressure	: 1011 mmbar
Serial No.	: TPH050046	Relative Humidity	: 49 %
Verification Module (Electronic Sensor Check) :			
Verification Module No. : 21 WB = 12.5 °C, DB = 47.1 °C, G = 69.3 °C			
Result of Verification : Without Adjustment			
Wet Probe Temperature Measurement			
Verification Module Reading (°C)	UUC* Reading (°C)	Correction (°C)	Tolerance Limit (°C)
12.5	12.4	0.1	± 0.5
Dry Probe Temperature Measurement			
Verification Module Reading (°C)	UUC* Reading (°C)	Correction (°C)	Tolerance Limit (°C)
47.1	47.3	-0.2	± 0.5
Globe Probe Temperature Measurement			
Verification Module Reading (°C)	UUC* Reading (°C)	Correction (°C)	Tolerance Limit (°C)
69.3	69.2	0.1	± 0.5
UUC* = UNIT UNDER CALIBRATION			

Verified by : 
(Mr. Adul Dangklom)

Approved by : 
(Mr. Peera Detudom)



Certificate of Calibration

Certificate Number : SPR23110050-5

Page : 1 of 3

Customer : S.P.S. CONSULTING SERVICE CO., LTD.

7 Soi Phaholyothin 24 Phaholyothin Road., Jompol, Chatuchak,
Bangkok 10900

Equipment Name : Area Heat Stress Monitor

Manufacturer : Quest Technologies

Model : QUESTemp 32

Serial Number : TPK120034

ID. Number : B33

Environmental Conditions

Ambient Temperature : $23^{\circ}\text{C} \pm 2^{\circ}\text{C}$

Received Date : 03 Nov 2023

Relative Humidity : $50\% \pm 15\%$

Calibration Date : 03 Nov 2023

Location of Calibration : In-Lab

Recommend Due Date : 03 Nov 2024

Calibration Procedure : SP-CPT-04-13

Date of Issue : 04 Nov 2023

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 : Mr.Pitak Srisutam

Calibration Officer

Approved by :

(Mr.Prayoon Topart)

Authorized Signatory



Calibration Report

Certificate Number : SPR23110050-5

Page : 2 of 3

Reference Standards

Equipment Name	Model	Serial No.	Certificate No.	Due. Date
Humidity Chamber	TH-80S	N/A	SPR23010480-5	22 Feb 2024
THERMO-HYGROMETER	5020A	A47046	QR23-0176	26 Jan 2024

Traceability

This certification is traceable to the International System of Unit maintained at :

SP Metrology - SP Metrology system (Thailand) Co.Ltd.

Quality Reborn Co., Ltd



Result of Calibration

Certificate No. : SPR23110050-5

Page : 3 of 3

Temperature Accuracy in the Measurement. (WET)

Unit : °C

Temperature Setting	Standard Reading	UUC Reading	Error	Uncertainty (±)
30.0	30.014	30.2	0.186	0.20
35.0	35.012	35.2	0.188	0.20
40.0	40.017	40.2	0.183	0.20

Temperature Accuracy in the Measurement. (DRY)

Unit : °C

Temperature Setting	Standard Reading	UUC Reading	Error	Uncertainty (±)
30.0	30.014	30.0	-0.014	0.20
35.0	35.012	35.0	-0.012	0.20
40.0	40.017	40.0	-0.017	0.20

Temperature Accuracy in the Measurement. (GLOBE)

Unit : °C

Humidity Setting	Standard Reading	UUC Reading	Error	Uncertainty (±)
30.0	30.014	30.1	0.086	0.20
35.0	35.012	35.1	0.088	0.20
40.0	40.017	40.1	0.083	0.20

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 -



บริษัท เอส.พี.เอส. คอนซัลติ้ง เซอร์วิส จำกัด

S.P.S. CONSULTING SERVICE CO., LTD.

7 ซอยพหลโยธิน 24 ถนนพหลโยธิน แขวงจอมพล เขตจตุจักร กรุงเทพฯ 10900

7 Soi Phaholyothin 24, Phaholyothin Rd., Jompol, Chatuchak, Bangkok 10900

Tel : (662) 939-4370-72. Fax : (662) 513-4221. E-mail : sale@spscon.com, www.spscon.com

Heat 047_3

Heat Stress WBGT Meter Verification Report			
Verification Data			
Heat Stress WBGT Meter No.	: B33	Verification Date	: 17 February 2024
Brand	: Quest Technologies	Ambient Temp.	: 24.5 °C
Model	: QUESTemp 32	Barometric Pressure	: 1011 mmbar
Serial No.	: TPK120034	Relative Humidity	: 49 %
Verification Module (Electronic Sensor Check) :			
Verification Module No. : 21 WB = 12.5 °C, DB = 47.1 °C, G = 69.3 °C			
Result of Verification : Without Adjustment			
Wet Probe Temperature Measurement			
Verification Module Reading (°C)	UUC* Reading (°C)	Correction (°C)	Tolerance Limit (°C)
12.5	12.3	0.2	± 0.5
Dry Probe Temperature Measurement			
Verification Module Reading (°C)	UUC* Reading (°C)	Correction (°C)	Tolerance Limit (°C)
47.1	47.1	0.0	± 0.5
Globe Probe Temperature Measurement			
Verification Module Reading (°C)	UUC* Reading (°C)	Correction (°C)	Tolerance Limit (°C)
69.3	69.3	0.0	± 0.5
UUC* = UNIT UNDER CALIBRATION			

Verified by :

(Mr. Adul Dangklom)

Approved by :

(Mr. Peera Detudom)

คุณภาพอากาศในสถานประกอบการ



บริษัท เอส.พี.เอส. คอนซัลติ้ง เซอร์วิส จำกัด
S.P.S. CONSULTING SERVICE CO., LTD.
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Tel : (662) 939-4370-72. Fax : (662) 513-4221, E-mail : sale@spscon.com., www.spscon.com

Personal Pump Calibration Report

Calibration Method : Dry Cal Primary Flowmeter

Model : Defender 510-H

S/N : 136164

Environmental Conditions

Temperature : 25 ± 3 °C
Pressure : 1010 ± 15 mmbar

Personal Pump Data				Calibration Data								
No.	Brand	Model	Serial No.	Date	Flow Rate (mL/min)						Value From Calibration Curve	
					Setting			Actual (Q std.)				
					1	2	3	1	2	3	y	R ²
B41	SKC	224-PCXR4	612669	05/01/2024	1,000	1,500	2,000	999	1,496	1,991	0.996x + 1.914	1.000
B42	SKC	224-PCXR4	626041	03/01/2024	1,000	1,500	2,000	1,004	1,498	1,991	0.986x + 19.248	1.000
B43	SKC	224-PCXR4	034636	03/01/2024	1,000	1,500	2,000	1,000	1,501	1,992	0.991x + 11.682	1.000
B44	SKC	224-PCXR8	529341	03/01/2024	1,000	1,500	2,000	1,002	1,502	2,002	1.004x – 6.860	1.000
B45	SKC	224-PCXR8	529594	03/01/2024	1,000	1,500	2,000	1,001	1,501	1,987	0.987x + 16.026	1.000
B46	SKC	224-PCXR8	566743	04/01/2024	1,000	1,500	2,000	995	1,506	2,002	1.013x – 27.915	0.999
B47	SKC	224-PCXR8	566747	04/01/2024	1,000	1,500	2,000	1,002	1,502	2,004	1.010x – 21.769	0.999
B48	SKC	224-PCXR8	566753	04/01/2024	1,000	1,500	2,000	1,000	1,493	1,998	0.997x + 0.239	1.000
B49	SKC	224-PCXR8	566780	04/01/2024	1,000	1,500	2,000	1,003	1,502	2,006	1.011x – 21.550	0.999
B50	SKC	224-PCXR8	500400	03/01/2024	1,000	1,500	2,000	1,001	1,496	2,002	1.001x – 2.900	1.000
B51	SKC	224-PCXR8	500363	03/01/2024	1,000	1,500	2,000	996	1,502	2,000	1.011x – 25.709	0.999
B52	SKC	224-PCXR8	093186	03/01/2024	1,000	1,500	2,000	994	1,496	1,992	0.995x + 1.751	1.000
B53	SKC	224-PCXR8	707670	05/01/2024	1,000	1,500	2,000	1,002	1,501	2,002	1.008x – 16.042	0.999
B54	SKC	224-PCXR3	509821	05/01/2024	1,000	1,500	2,000	995	1,501	2,002	1.016x – 32.282	0.999
B55	SKC	224-PCXR3	510710	05/01/2024	1,000	1,500	2,000	1,004	1,495	1,992	0.991x + 7.666	1.000
B56	SKC	224-PCXR3	511450	05/01/2024	1,000	1,500	2,000	1,002	1,500	2,001	1.005x – 8.559	1.000
B57	SKC	224-PCXR3	510798	03/01/2024	1,000	1,500	2,000	997	1,492	1,999	0.999x – 2.122	1.000
B58	SKC	224-PCXR3	509852	03/01/2024	1,000	1,500	2,000	1,000	1,500	1,999	1.007x – 19.073	0.999
B59	SKC	224-PCXR3	509862	04/01/2024	1,000	1,500	2,000	995	1,503	1,995	0.998x + 2.118	1.000
B60	SKC	224-PCXR3	512655	04/01/2024	1,000	1,500	2,000	1,004	1,510	2,004	1.005x – 6.421	0.999
B61	SKC	224-PCXR3	503915	04/01/2024	1,000	1,500	2,000	993	1,492	1,999	1.003x – 11.706	1.000
B62	SKC	224-PCXR3	505975	03/01/2024	1,000	1,500	2,000	999	1,494	1,996	0.996x + 0.822	1.000
B63	SKC	224-PCXR3	511432	03/01/2024	1,000	1,500	2,000	990	1,501	2,000	1.017x – 36.259	0.999
B64	SKC	224-PCXR3	508302	03/01/2024	1,000	1,500	2,000	998	1,492	1,989	0.990x + 10.175	1.000
B65	SKC	224-PCXR3	508310	03/01/2024	1,000	1,500	2,000	1,002	1,501	2,002	1.007x – 13.537	1.000
B66	SKC	224-PCXR3	509861	04/01/2024	1,000	1,500	2,000	1,002	1,491	1,992	0.988x + 13.744	1.000
B67	SKC	224-PCXR3	506295	04/01/2024	1,000	1,500	2,000	995	1,508	2,004	1.007x – 12.843	1.000
B68	SKC	224-PCXR3	505872	04/01/2024	1,000	1,500	2,000	1,002	1,491	1,998	0.995x + 4.040	1.000
B69	SKC	224-PCXR3	508375	04/01/2024	1,000	1,500	2,000	1,003	1,499	2,000	1.009x – 18.977	0.999
B70	SKC	224-PCXR3	510623	05/01/2024	1,000	1,500	2,000	992	1,493	1,996	1.002x – 7.730	1.000
B71	SKC	224-PCXR3	508367	05/01/2024	1,000	1,500	2,000	994	1,506	2,002	1.015x – 31.561	0.999
B72	SKC	224-PCXR3	505977	03/01/2024	1,000	1,500	2,000	1,003	1,499	1,994	0.991x + 9.042	1.000
B73	SKC	224-PCXR3	512606	04/01/2024	1,000	1,500	2,000	1,001	1,501	2,004	1.008x – 14.346	1.000
B74	SKC	224-PCXR3	505993	04/01/2024	1,000	1,500	2,000	996	1,497	1,995	1.001x – 7.036	1.000
B75	SKC	224-PCXR3	509820	05/01/2024	1,000	1,500	2,000	996	1,496	1,991	0.996x + 1.432	1.000
B76	SKC	224-PCXR3	509811	05/01/2024	1,000	1,500	2,000	993	1,499	1,999	1.006x – 14.283	1.000
B77	SKC	224-PCXR3	508301	05/01/2024	1,000	1,500	2,000	1,001	1,501	2,003	1.013x – 25.406	0.999
B78	SKC	224-PCXR3	510677	05/01/2024	1,000	1,500	2,000	995	1,503	1,999	1.012x – 27.520	0.999
B79	SKC	224-PCXR3	510920	05/01/2024	1,000	1,500	2,000	994	1,494	1,994	1.001x – 6.178	1.000

Calibrated by :

(Mr. Abdul Dangklom)

Approved by :

(Mr. Peera Detudom)



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Personal Pump Calibration Report

Calibration Method : Dry Cal Primary Flowmeter

Model : Defender 510-H

S/N : 136164

Environmental Conditions

Temperature : 25 \pm 3 $^{\circ}$ C
Pressure : 1010 \pm 15 mmbar

Personal Pump Data				Calibration Data								
No.	Brand	Model	Serial No.	Date	Flow Rate (ml/min)						Value From Calibration Curve	
					Setting			Actual (Q std.)				
					1	2	3	1	2	3	y	R ²
B80	SKC	224-PCXR3	504569	05/01/2024	1,000	1,500	2,000	1,002	1,498	2,002	1.012x – 24.186	0.999
B81	SKC	224-PCXR3	503480	05/01/2024	1,000	1,500	2,000	996	1,499	2,000	1.014x – 30.165	0.999
B82	SKC	224-PCXR3	505673	04/01/2024	1,000	1,500	2,000	994	1,498	1,996	1.000x – 4.746	1.000
B83	SKC	224-PCXR3	510785	04/01/2024	1,000	1,500	2,000	1,010	1,500	1,999	1.003x – 7.793	0.999
B84	SKC	224-PCXR3	508333	04/01/2024	1,000	1,500	2,000	997	1,498	1,991	0.993x + 4.810	1.000
B85	SKC	224-PCXR3	505757	05/01/2024	1,000	1,500	2,000	994	1,502	1,998	1.006x – 14.562	1.000
B86	SKC	224-PCXR3	512625	03/01/2024	1,000	1,500	2,000	1,015	1,503	2,004	0.999x + 3.063	0.999
B87	SKC	224-PCXR3	504324	03/01/2024	1,000	1,500	2,000	1,000	1,496	2,000	1.000x – 0.710	1.000
B88	SKC	224-PCXR3	508307	03/01/2024	1,000	1,500	2,000	995	1,498	1,993	0.997x + 0.574	1.000
B89	SKC	224-PCXR3	509860	03/01/2024	1,000	1,500	2,000	1,000	1,499	2,004	1.010x – 17.509	1.000
B90	SKC	224-PCXR3	508366	04/01/2024	1,000	1,500	2,000	995	1,508	2,000	1.005x – 10.091	1.000
B91	SKC	224-PCXR3	510919	04/01/2024	1,000	1,500	2,000	1,000	1,500	1,997	0.992x + 7.522	1.000
B92	SKC	224-PCXR3	510987	04/01/2024	1,000	1,500	2,000	1,002	1,501	1,999	0.999x + 1.097	1.000
B93	SKC	224-PCXR3	509845	04/01/2024	1,000	1,500	2,000	996	1,496	2,004	1.009x – 15.822	1.000
B94	SKC	224-PCXR8	A127871	05/01/2024	1,000	1,500	2,000	1,000	1,499	2,002	1.007x – 19.184	0.999
B95	SKC	224-PCXR8	A127921	05/01/2024	1,000	1,500	2,000	994	1,502	2,002	1.015x – 30.559	0.999
B96	SKC	224-PCXR8	A127942	04/01/2024	1,000	1,500	2,000	998	1,499	1,996	1.001x – 3.486	1.000
B97	SKC	224-PCXR8	A127955	05/01/2024	1,000	1,500	2,000	1,003	1,501	2,003	1.010x – 20.082	0.999
B98	SKC	224-PCXR8	A127956	05/01/2024	1,000	1,500	2,000	996	1,497	1,998	1.003x – 6.330	1.000

Calibrated by :

(Mr. Abdul Dangkrom)

Approved by :

(Mr. Peera Detudom)



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Personal Pump Calibration Report

Calibration Method : Dry Cal Primary Flowmeter

Model : Defender 510-H

S/N : 136164

Environmental Conditions

Temperature 25 \pm 3 $^{\circ}$ C
Pressure 1010 \pm 15 mmbar

Personal Pump Data				Calibration Data								
No.	Brand	Model	Serial No.	Date	Flow Rate (mL/min)						Value From Calibration Curve	
					Setting			Actual (Q std.)				
					1	2	3	1	2	3	y	R ²
B01	SKC	224-PCXR4	262101	05/04/2024	1,000	1,500	2,000	993	1,496	1,998	1.001x – 3.430	1.000
B02	SKC	224-PCXR4	626166	05/04/2024	1,000	1,500	2,000	1,004	1,506	2,000	1.007x – 16.572	0.999
B03	SKC	224-PCXR4	612968	09/04/2024	1,000	1,500	2,000	997	1,498	2,004	1.008x – 13.756	1.000
B04	SKC	224-PCXR4	602804	08/04/2024	1,000	1,500	2,000	1,001	1,511	1,993	0.997x + 4.427	1.000
B05	SKC	224-PCXR4	612693	08/04/2024	1,000	1,500	2,000	1,005	1,510	2,002	1.009x – 16.400	0.999
B06	SKC	224-PCXR4	262188	08/04/2024	1,000	1,500	2,000	1,003	1,510	2,004	1.005x – 8.687	0.999
B07	SKC	224-PCXR4	626262	05/04/2024	1,000	1,500	2,000	997	1,500	1,996	0.995x + 4.930	1.000
B08	SKC	224-PCXR4	626100	04/04/2024	1,000	1,500	2,000	1,003	1,508	2,002	1.011x – 19.679	0.999
B09	SKC	224-PCXR4	626479	08/04/2024	1,000	1,500	2,000	996	1,499	1,994	0.994x + 3.159	1.000
B10	SKC	224-PCXR4	091950	04/04/2024	1,000	1,500	2,000	995	1,512	2,000	1.015x – 30.041	0.998
B11	SKC	224-PCXR8	564315	08/04/2024	1,000	1,500	2,000	994	1,494	2,000	1.006x – 10.717	1.000
B12	SKC	224-PCXR4	034656	08/04/2024	1,000	1,500	2,000	1,005	1,511	2,002	1.008x – 14.857	0.999
B13	SKC	224-PCXR4	602073	05/04/2024	1,000	1,500	2,000	998	1,501	1,997	0.998x + 2.728	1.000
B14	SKC	224-PCXR4	626313	04/04/2024	1,000	1,500	2,000	998	1,491	1,991	0.994x + 4.411	1.000
B15	SKC	224-PCXR4	626474	04/04/2024	1,000	1,500	2,000	1,004	1,505	2,003	1.009x – 16.951	0.999
B16	SKC	224-PCXR4	626477	04/04/2024	1,000	1,500	2,000	997	1,502	2,000	1.005x – 13.936	1.000
B17	SKC	224-PCXR4	626860	05/04/2024	1,000	1,500	2,000	998	1,495	1,990	0.995x + 3.681	1.000
B18	SKC	224-PCXR4	691484	05/04/2024	1,000	1,500	2,000	1,004	1,506	2,001	1.007x – 12.627	0.999
B19	SKC	224-PCXR4	691599	08/04/2024	1,000	1,500	2,000	994	1,507	1,997	1.003x – 4.519	1.000
B20	SKC	224-PCXR4	691587	08/04/2024	1,000	1,500	2,000	993	1,514	1,999	1.013x – 27.943	0.998
B21	SKC	224-PCXR4	691531	08/04/2024	1,000	1,500	2,000	997	1,498	1,993	0.996x – 1.121	1.000
B22	SKC	224-PCXR4	691654	08/04/2024	1,000	1,500	2,000	1,002	1,500	2,005	1.013x – 23.316	0.999
B23	SKC	224-PCXR4	798393	09/04/2024	1,000	1,500	2,000	995	1,506	1,999	1.014x – 28.370	0.999
B24	SKC	224-PCXR4	626363	04/04/2024	1,000	1,500	2,000	997	1,505	2,003	1.016x – 28.805	0.999
B25	SKC	224-PCXR4	798489	04/04/2024	1,000	1,500	2,000	1,000	1,494	2,002	0.999x - 1.300	1.000
B26	SKC	224-PCXR4	798479	05/04/2024	1,000	1,500	2,000	1,001	1,501	1,997	0.998x + 2.010	1.000
B27	SKC	224-PCXR4	691673	08/04/2024	1,000	1,500	2,000	995	1,505	2,001	1.014x – 28.031	0.999
B28	SKC	224-PCXR4	691570	08/04/2024	1,000	1,500	2,000	1,004	1,498	2,000	1.007x – 15.352	0.999
B29	SKC	224-PCXR4	626472	08/04/2024	1,000	1,500	2,000	1,003	1,496	2,003	1.003x – 5.903	1.000
B30	SKC	224-PCXR4	691489	05/04/2024	1,000	1,500	2,000	1,005	1,511	2,005	1.007x – 8.527	0.999
B31	SKC	224-PCXR4	691509	09/04/2024	1,000	1,500	2,000	991	1,495	1,998	1.006x – 14.067	1.000
B32	SKC	224-PCXR4	091567	05/04/2024	1,000	1,500	2,000	993	1,504	1,999	1.013x – 26.659	0.999
B33	SKC	224-PCXR4	091756	05/04/2024	1,000	1,500	2,000	994	1,500	1,995	1.000x – 2.836	1.000
B34	SKC	224-PCXR4	612962	08/04/2024	1,000	1,500	2,000	1,004	1,503	2,001	1.006x – 11.243	0.999
B35	SKC	224-PCXR4	602682	08/04/2024	1,000	1,500	2,000	997	1,496	1,995	0.998x – 2.772	1.000
B36	SKC	224-PCXR4	626164	05/04/2024	1,000	1,500	2,000	997	1,506	2,000	1.006x – 14.159	0.999
B37	SKC	224-PCXR4	626256	04/04/2024	1,000	1,500	2,000	997	1,507	1,998	1.010x – 23.269	0.999
B38	SKC	224-PCXR4	626167	04/04/2024	1,000	1,500	2,000	996	1,496	1,997	1.004x – 7.259	1.000
B39	SKC	224-PCXR4	034637	04/04/2024	1,000	1,500	2,000	1,007	1,499	2,000	1.003x – 11.120	0.999
B40	SKC	224-PCXR4	798349	08/04/2024	1,000	1,500	2,000	995	1,506	2,001	1.013x – 26.810	0.999

Calibrated by :

(Mr. Adul Dangklom)

Approved by :

(Mr. Peera Detudom)



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S.P.S. CONSULTING SERVICE CO., LTD.
7 ซอยพหลโยธิน 24 ถนนพหลโยธิน แขวงจอมพล เขตจตุจักร กรุงเทพฯ 10900
7 Soi Phaholyothin 24, Phaholyothin Rd., Jompol, Chatuchak, Bangkok 10900
Tel : (662) 939-4370-72, Fax : (662) 513-4221, E-mail : sale@spscon.com, www.spscon.com

Personal Pump Calibration Report

Calibration Method : Dry Cal Primary Flowmeter

Model : Defender 510-H

S/N : 136164

Environmental Conditions

Temperature : 25 \pm 3 $^{\circ}$ C
Pressure : 1010 \pm 15 mmbar

Personal Pump Data				Calibration Data								
No.	Brand	Model	Serial No.	Date	Flow Rate (mL/min)						Value From Calibration Curve	
					Setting			Actual (Q std.)				
					1	2	3	1	2	3	y	R ²
B41	SKC	224-PCXR4	612669	05/04/2024	1,000	1,500	2,000	1,001	1,498	1,990	0.994x + 6.342	1.000
B42	SKC	224-PCXR4	626041	04/04/2024	1,000	1,500	2,000	1,006	1,496	1,990	0.984x + 20.844	1.000
B43	SKC	224-PCXR4	034636	04/04/2024	1,000	1,500	2,000	998	1,498	1,989	0.989x + 12.360	1.000
B44	SKC	224-PCXR8	529341	09/04/2024	1,000	1,500	2,000	1,000	1,501	2,002	1.005x – 9.213	1.000
B45	SKC	224-PCXR8	529594	04/04/2024	1,000	1,500	2,000	1,002	1,502	1,989	0.988x + 16.584	1.000
B46	SKC	224-PCXR8	566743	04/04/2024	1,000	1,500	2,000	996	1,507	2,001	1.012x – 24.724	0.999
B47	SKC	224-PCXR8	566747	08/04/2024	1,000	1,500	2,000	1,005	1,500	2,002	1.007x – 16.424	0.999
B48	SKC	224-PCXR8	566753	09/04/2024	1,000	1,500	2,000	998	1,492	1,997	0.998x - 1.157	1.000
B49	SKC	224-PCXR8	566780	08/04/2024	1,000	1,500	2,000	1,004	1,503	2,005	1.009x – 18.040	0.999
B50	SKC	224-PCXR8	500400	04/04/2024	1,000	1,500	2,000	1,003	1,495	2,003	1.000x – 1.783	1.000
B51	SKC	224-PCXR8	500363	04/04/2024	1,000	1,500	2,000	995	1,500	2,002	1.013x – 28.701	0.999
B52	SKC	224-PCXR8	093186	04/04/2024	1,000	1,500	2,000	992	1,494	1,991	0.996x + 0.116	1.000
B53	SKC	224-PCXR8	707670	08/04/2024	1,000	1,500	2,000	1,000	1,502	2,001	1.009x – 16.999	0.999
B54	SKC	224-PCXR3	509821	08/04/2024	1,000	1,500	2,000	996	1,503	2,002	1.015x – 30.009	0.999
B55	SKC	224-PCXR3	510710	05/04/2024	1,000	1,500	2,000	1,000	1,494	1,993	0.995x + 0.965	1.000
B56	SKC	224-PCXR3	511450	09/04/2024	1,000	1,500	2,000	1,004	1,499	2,000	1.002x – 4.651	1.000
B57	SKC	224-PCXR3	510798	08/04/2024	1,000	1,500	2,000	996	1,494	1,998	1.000x – 2.680	1.000
B58	SKC	224-PCXR3	509852	08/04/2024	1,000	1,500	2,000	1,002	1,501	2,000	1.006x – 16.480	0.999
B59	SKC	224-PCXR3	509862	08/04/2024	1,000	1,500	2,000	997	1,501	1,998	0.999x + 1.041	1.000
B60	SKC	224-PCXR3	512655	05/04/2024	1,000	1,500	2,000	1,005	1,507	2,003	1.003x – 4.627	1.000
B61	SKC	224-PCXR3	503915	05/04/2024	1,000	1,500	2,000	993	1,490	2,000	1.004x – 12.823	1.000
B62	SKC	224-PCXR3	505975	05/04/2024	1,000	1,500	2,000	1,001	1,495	1,997	0.995x + 2.616	1.000
B63	SKC	224-PCXR3	511432	05/04/2024	1,000	1,500	2,000	993	1,503	1,999	1.014x – 30.715	0.999
B64	SKC	224-PCXR3	508302	08/04/2024	1,000	1,500	2,000	1,000	1,493	1,987	0.988x + 13.991	1.000
B65	SKC	224-PCXR3	508310	09/04/2024	1,000	1,500	2,000	1,003	1,500	2,003	1.006x – 12.021	1.000
B66	SKC	224-PCXR3	509861	08/04/2024	1,000	1,500	2,000	1,004	1,489	1,990	0.986x + 16.775	1.000
B67	SKC	224-PCXR3	506295	04/04/2024	1,000	1,500	2,000	997	1,506	2,003	1.004x – 9.094	1.000
B68	SKC	224-PCXR3	505872	04/04/2024	1,000	1,500	2,000	1,004	1,490	1,997	0.992x + 7.829	1.000
B69	SKC	224-PCXR3	508375	04/04/2024	1,000	1,500	2,000	1,005	1,500	1,998	1.006x – 13.832	0.999
B70	SKC	224-PCXR3	510623	08/04/2024	1,000	1,500	2,000	995	1,491	1,996	1.000x – 4.938	1.000
B71	SKC	224-PCXR3	508367	09/04/2024	1,000	1,500	2,000	996	1,504	2,000	1.012x – 27.572	0.999
B72	SKC	224-PCXR3	505977	09/04/2024	1,000	1,500	2,000	1,001	1,500	1,995	0.994x + 5.791	1.000
B73	SKC	224-PCXR3	512606	04/04/2024	1,000	1,500	2,000	1,002	1,499	2,002	1.007x – 12.671	1.000
B74	SKC	224-PCXR3	505993	04/04/2024	1,000	1,500	2,000	995	1,495	1,996	1.003x – 9.987	1.000
B75	SKC	224-PCXR3	509820	05/04/2024	1,000	1,500	2,000	998	1,497	1,993	0.997x + 1.432	1.000
B76	SKC	224-PCXR3	509811	05/04/2024	1,000	1,500	2,000	992	1,497	2,000	1.008x – 17.753	1.000
B77	SKC	224-PCXR3	508301	05/04/2024	1,000	1,500	2,000	1,004	1,499	2,001	1.010x – 19.743	0.999
B78	SKC	224-PCXR3	510677	08/04/2024	1,000	1,500	2,000	997	1,505	2,001	1.013x – 27.321	0.999
B79	SKC	224-PCXR3	510920	09/04/2024	1,000	1,500	2,000	995	1,495	1,993	1.000x – 4.702	1.000

Calibrated by :

(Mr. Adul Dangklom)

Approved by :

(Mr. Peera Detudom)



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7 Soi Phaholyothin 24, Phaholyothin Rd., Jompol, Chatuchak, Bangkok 10900
Tel : (662) 939-4370-72. Fax : (662) 513-4221. E-mail : sale@spscon.com., www.spscon.com

Rotameter Calibration Report (For Personal Pump High Flow Adjust)

Calibration Method : Dry Cal Primary Flowmeter

Model : Defender 510-H

S/N : 136164

Calibration Data

Rotameter Data			Calibration Data								
No.	Brand	Model	Date	Flow Rate (mL/min)						Value From Calibration Curve	
				Flow Rate (Reading)			Actual (Q std.)				
				1	2	3	1	2	3	y	R ²
H-B01	Dwyer	VFB-65	04/01/2024	500	1,000	2,000	506.5	991.1	1974.3	0.989x + 9.286	1.000
H-B02	Dwyer	VFB-65	04/01/2024	500	1,000	2,000	496.7	997.6	1996.1	0.994x + 4.509	1.000
H-B03	Dwyer	VFB-65	04/01/2024	500	1,000	2,000	497.6	988.8	2009.6	1.004x - 14.177	0.999
H-B04	Dwyer	VFB-65	03/01/2024	500	1,000	2,000	501.6	998.7	2006.5	0.997x - 0.777	1.000
H-B05	Dwyer	VFB-65	05/01/2024	500	1,000	2,000	500.4	997.3	1974.3	0.980x + 21.602	0.999
H-B06	Dwyer	VFB-65	05/01/2024	500	1,000	2,000	504.9	994.8	1984.0	1.003x - 5.213	1.000
H-B07	Dwyer	VFB-65	03/01/2024	500	1,000	2,000	502.6	990.6	2016.7	1.001x - 0.998	1.000
H-B08	Dwyer	VFB-65	04/01/2024	500	1,000	2,000	499.7	998.7	1979.8	0.996x + 3.580	0.999
H-B09	Dwyer	VFB-65	04/01/2024	500	1,000	2,000	504.1	1004.3	2010.7	0.993x + 13.998	1.000
H-B10	Dwyer	VFB-65	03/01/2024	500	1,000	2,000	496.2	999.3	2009.2	0.996x + 3.860	1.000

Calibrated by :

(Mr. Adul Dangklom)

Approved by :

(Mr. Peera Detudom)



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S.P.S. CONSULTING SERVICE CO., LTD.
7 ซอยพหลโยธิน 24 ถนนพหลโยธิน แขวงจอมพล เขตจตุจักร กรุงเทพฯ 10900
7 Soi Phaholyothin 24, Phaholyothin Rd., Jompol, Chaluchak, Bangkok 10900
Tel : (662) 939-4370-72, Fax : (662) 513-4221, E-mail : sale@spscon.com., www.spscon.com

Rotameter Calibration Report (For Personal Pump High Flow Adjust)

Calibration Method : Dry Cal Primary Flowmeter

Model : Defender 510-H

S/N : 136164

Calibration Data

Rotameter Data			Calibration Data								
No.	Brand	Model	Date	Flow Rate (mL/min)						Value From Calibration Curve	
				Flow Rate (Reading)			Actual (Q std.)				
				1	2	3	1	2	3	y	R ²
H-B01	Dwyer	VFB-65	08/04/2024	500	1,000	2,000	504.3	992.1	1976.8	0.991x + 6.353	1.000
H-B02	Dwyer	VFB-65	04/04/2024	500	1,000	2,000	496.5	998.8	1996.7	0.995x + 4.247	1.000
H-B03	Dwyer	VFB-65	05/04/2024	500	1,000	2,000	498.6	991.4	2011.0	1.003x - 12.161	0.999
H-B04	Dwyer	VFB-65	04/04/2024	500	1,000	2,000	501.4	1000.9	2008.3	0.998x - 1.566	1.000
H-B05	Dwyer	VFB-65	08/04/2024	500	1,000	2,000	502.9	999.5	1974.5	0.979x + 24.520	0.999
H-B06	Dwyer	VFB-65	04/04/2024	500	1,000	2,000	504.7	996.0	1984.4	1.005x - 6.145	1.000
H-B07	Dwyer	VFB-65	05/04/2024	500	1,000	2,000	502.2	992.8	2017.1	1.000x - 0.160	1.000
H-B08	Dwyer	VFB-65	04/04/2024	500	1,000	2,000	500.3	1000.7	1980.2	0.995x + 5.203	0.999
H-B09	Dwyer	VFB-65	09/04/2024	500	1,000	2,000	503.3	1005.0	2011.1	0.994x + 13.348	1.000
H-B10	Dwyer	VFB-65	08/04/2024	500	1,000	2,000	498.2	1001.7	2008.8	0.995x + 5.854	1.000

Calibrated by :

(Mr.Adul Dangklom)

Approved by :

(Mr. Peera Detudom)

**QUALITY CALIBRATION CO.,LTD.**

235 Petchkasem 63/2 Road, Laksong, Bangkae, Bangkok 10160

Tel (662) 421-5402, (662) 444-0152-3, Fax (662) 809-4584

www.qcalibration.com

CERTIFICATE No : 23M2441

REFERENCE No : 68471-1

PAGE : 1 OF 2

Certificate of Calibration

EQUIPMENT : DIGITAL BALANCE

MANUFACTURER : METTLER TOLEDO

MODEL : XS105DU

SERIAL No : 1126422905

ID No : BA 05/50

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 : 10-Mar-23

APPROVED BY : 

ISSUED DATE : 16-Mar-23

RECEIVED DATE : 10-Mar-23

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



CERTIFICATE No : 23M2441

PAGE : 2 OF 2

Calibration Report

EQUIPMENT : DIGITAL BALANCE MODEL : XS105DU
MANUFACTURER : METTLER TOLEDO S/N : 1126422905
ID No : BA 05/50 RECEIVED DATE : 10-Mar-23
AIR PRESSURE : 1010mbar \pm 1mbar CALIBRATION DATE : 10-Mar-23
AMBIENT TEMPERATURE : 23°C \pm 1°C RELATIVE HUMIDITY : 49 %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. THIS RESULT WAS FOUND ACCURATE AS SHOWN ON 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

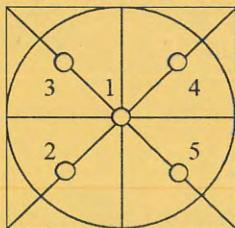
2. TARE FUNCTION : NORMAL

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)
0.00	0.00000	0.00000	0.000039
0.02	0.02000	0.00000	0.000039
0.10	0.10000	0.00000	0.000039
0.20	0.20001	-0.00001	0.000040
0.50	0.50001	-0.00001	0.000040
1.00	1.00000	0.00000	0.000041
2.00	2.00003	-0.00003	0.000042
5.00	5.00001	-0.00001	0.000046
10.00	10.00003	-0.00003	0.000053
20.00	20.00005	-0.00005	0.000067
50.00	50.00001	-0.00001	0.00011
100.00	100.00001	-0.00001	0.00019
200.00	200.00001	-0.00001	0.00032

5. OFF CENTER LOADING ERROR



POINT	READING (g)
1	50.0000
2	50.0001
3	50.0000
4	50.0000
5	49.9999
OFF-CENTER LOADING	0.0001

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



CERTIFICATE No : 24M2227

REFERENCE No : 72448-1

PAGE : 1 OF 2

Certificate of Calibration

EQUIPMENT : DIGITAL BALANCE

MANUFACTURER : METTLER TOLEDO

MODEL : XS105DU

SERIAL No : 1126422905

ID No : BA05/50

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



CERTIFICATE No : 24M2227

PAGE : 2 OF 2

Calibration Report

EQUIPMENT : DIGITAL BALANCE MODEL : XS105DU
MANUFACTURER : METTLER TOLEDO S/N : 1126422905
ID No : BA05/50 RECEIVED DATE : 08-Mar-24
AIR PRESSURE : 1010mbar \pm 1mbar CALIBRATION DATE : 08-Mar-24
AMBIENT TEMPERATURE : 25°C \pm 1°C RELATIVE HUMIDITY : 53 %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

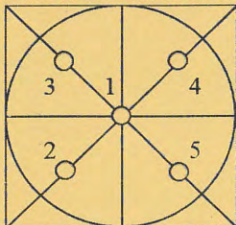
2. TARE FUNCTION : NORMAL

3. REPEATABILITY OF READING AT 200 g WAS 0.000055 g

4. DEPARTURE FROM NOMINAL VALUE/ LINEARITY

NOMINAL VALUE (g)	BALANCE READING (g)	CORRECTION (g)	UNCERTAINTY (\pm g)
0.00	0.00000	0.00000	0.000065
0.02	0.02001	-0.00001	0.000065
0.10	0.10002	-0.00002	0.000066
0.20	0.20001	-0.00001	0.000066
0.50	0.50001	-0.00001	0.000065
1.00	1.00003	-0.00003	0.000066
2.00	2.00001	-0.00001	0.000067
5.00	5.00001	-0.00001	0.000068
10.00	9.99994	0.00006	0.000070
20.00	20.00008	-0.00008	0.000078
50.00	50.0000	0.0000	0.00013
100.00	100.0001	-0.0001	0.00019
120.00	120.0001	-0.0001	0.00022

5. OFF CENTER LOADING ERROR



POINT	READING (g)
1	50.0000
2	50.0000
3	50.0000
4	50.0000
5	50.0000
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



Certificate of Calibration

Aquion : Anion (ID#894)

This certificate is to verify that instrument below are calibrated
by Archemica Lab Co.,Ltd.

AQUION S/N : 190840059

AS-DV S/N : 190915235

for

S.P.S. Consulting Service Co., Ltd.

ARCHEMICA LAB
บริษัท อาร์เคมีกา แล็บ จำกัด
ARCHEMICA LAB CO.,LTD

Operator Signature : 

Date : Jul 3, 2023

(Mr.Nutdanai Laekhwan)

Applications Chemist

ระดับเสียงในสถานประกอบการ

THAILAND INSTITUTE OF SCIENTIFIC AND TECHNOLOGICAL RESEARCH (TISTR)

Request No. 21-66/0413

MTC No. EEL. BP. 109/0366

CALIBRATION CERTIFICATE

Submitted by : S.P.S. Consulting Service Co.,Ltd.

Address : 7 Soi Phaholyothin 24, Phaholyothin Road, Jompol, Chatuchak, Bangkok 10900.

Calibrated at : Electrical and Electronic Standards Laboratory, Industrial Metrology and Testing Service Centre.
: Soi 1C, Bangpoo Industrial Estate, Sukhumvit Rd., Muang, Samutprakan 10280.

Instrument Calibrated :

Description : Sound Calibrator

Manufacturer : ACO

Model : 2127

Serial No. : 130006

Ambient Environment

Temperature : $(23 \pm 3) ^\circ\text{C}$

Relative Humidity : $(50 \pm 15) \%$

Ambient Pressure : $(101.325 \pm 1.500) \text{ kPa}$

Standards used : 1. Digital Function Synthesizer NF Electronic DF-193A S/N 122037.
2. Measuring Amplifier Bruel&Kjaer 2636 S/N 1537484.
3. Programmable Attenuator Tamagawa TPA-303A S/N OF 2214.
4. Digital Multimeter Agilent 34401A S/N MY44005560.
5. Pressure Transmitter Vaisala PTB202AD S/N T0650001.
6. Audio Analyzer Keithley 2015-P S/N 4106495.
7. Condenser Microphone Bruel&Kjaer 4180 S/N 2889871.

Calibration Procedure: CP-102-04 based on IEC 60942-2003. The sound pressure level of instrument was measured by standard microphone using an insert voltage technique.

This instrument has been calibrated against standards maintained at Electrical and Electronic Standards Laboratory (EEL), which are traceable to the International System of Units through the National Institute of Metrology (Thailand).

The information on actual reading is attached herewith and the uncertainty limits quoted refer to the measured values only.

Date of Receipt : 27 Mar. 2023

Date of Calibration : 29 Mar. 2023

1 /

The results relate only to the items tested/calibrated or value assigned.

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FM.BL.MTC.002 Rev.4

Head Office

35 Mu 3 Tambon Khlong Ha, Amphoe Khlong Luang,
Changwat Pathumthani 12120, Thailand
Tel. (66) 0 2577 9000
Fax. (66) 0 2577 9009
E-mail : rumpai@tistr.or.th Website:www.tistr.or.th

Office/Laboratory

Soi 1C, Bangpoo Industrial Estate, Sukhumvit Road,
Amphoe Muang, Changwat Samutprakan 10280, Thailand
Tel. (66) 0 2323 1672-80 ext. 115, 116
Fax. (66) 0 2323 9165
E-mail : mtc@tistr.or.th

Office

196 Phahonyothin Road, Chatuchak, Bangkok 10900,
Thailand
Tel. (66) 0 2579 1121-30 ext. 5219, 5225, 5217
Fax. (66) 0 2579 8592
E-mail : sumalee@tistr.or.th

THAILAND INSTITUTE OF SCIENTIFIC AND TECHNOLOGICAL RESEARCH (TISTR)

Request No. 21-66/0413

MTC No. EEL. BP. 109/0366

The reported expanded uncertainty is based upon a standard uncertainty multiplied by a coverage factor $k = 2$, providing a level of confidence of approximately 95%.

Nominal Output of Unit Under Test = 94 dB re 20 μ Pa at 1000 Hz

Acoustic Output in dB re 20 μ Pa , Corrected to Reference Conditions : 101.325 kPa , 23.0°C and 50 %RH

1. Sound Pressure Level

Standard Microphone Type	Measured Sound Pressure Level (dB)	Deviated value (dB)	Uncertainty (dB)	Tolerance limit IEC60942:2003 Class 1
1/2 inch Bruel&Kjaer 4180	93.94	-0.06	± 0.10	± 0.40 dB

2. Frequency

Standard Microphone Type	Measured Frequency (Hz)	Deviated value (Hz)	Uncertainty (Hz)	Tolerance limit IEC60942:2003 Class 1
1/2 inch Bruel&Kjaer 4180	999.9	-0.1	± 1.5	$\pm 1.0\%$

3. Total distortion

Standard Microphone Type	Measured Total distortion (%)	Uncertainty (%)	Tolerance limit IEC60942:2003 Class 1
1/2 inch Bruel&Kjaer 4180	1.80	± 0.50	$\pm 3.0\%$

Note : 1. No adjustment.

2. The calibrator pressure correction was not included.

3. The microphone volume correction was not included.

Calibrated by :

(Mr. Weerachai Deechaiyae)

Approved by :

(Mr. Prawate Kluaypa)

Director

Electrical and Electronic Standards Laboratory

Industrial Metrology and Testing Service Centre

Date of Calibration : 29 Mar. 2023

Date of Issue : 30 Mar. 2023

Ref : 2011266032701228001

End of Certificate

2 / 2

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FM.BL.MTC.002 Rev.4

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35 Mu 3 Tambon Khlong Ha, Amphoe Khlong Luang,
Changwat Pathumthani 12120, Thailand
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Fax. (66) 0 2577 9009
E-mail : rumpai@tistr.or.th Website: www.tistr.or.th

Office/Laboratory

Soi 1C, Bangpoo Industrial Estate, Sukhumvit Road,
Amphoe Muang, Changwat Samutprakan 10280, Thailand
Tel. (66) 0 2323 1672-80 ext. 115, 116
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Office

196 Phahonyothin Road, Chatuchak, Bangkok 10900,
Thailand
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บริษัท เอส.พี.เอส. คอนซัลติ้ง เซอร์วิส จำกัด
S.P.S. CONSULTING SERVICE CO., LTD.
7 ซอยพหลโยธิน 24 ถนนพหลโยธิน แขวงจอมพล เขตจตุจักร กรุงเทพฯ 10900
7 Soi Phaholyothin 24, Phaholyothin Rd., Jompoli, Chatuchak, Bangkok 10900
Tel : (662) 939-4370-72 Fax : (662) 513-4221 E-mail : sale@spscon.com, www.spscon.com

Noise B_047/24

Sound Level Meter Calibration Report

Acoustic Calibrator Data

Brand	ACO	Number	AC 03/56
Model	2127	Serial No.	130006
Calibration Range	94 dB, 1000 Hz	Last Calibration	29 March 2023
		Due Date	29 March 2024

Calibration Data

Sound Level Meter Data				Calibration Data		
SLM No.	Brand	Model	Serial No.	Date	Actual Reading [dB]	
					Before Adjustment	After Adjustment
ACO-B03	ACO	6236	00222297	17 February 2024	94.0	94.0
Acoustic Certified Value : Thailand Institute of Scientific and Technological Research (TISTR)					93.94 ± 0.10 dB	

Calibrated by :

(Mr. Adul Dangklom)

Approved by :

(Mr. Peera Detudom)

Request No. 21-67/0304

MTC No. EEL. BP. 109/0267

CALIBRATION CERTIFICATE

Submitted by : S.P.S.Consulting Service Co.,Ltd.

Address : 7 Soi Phaholyothin 24, Phaholyothin Road, Jompol, Chatuchak, Bangkok 10900.

Calibrated at : Electrical and Electronic Standards Laboratory, Industrial Metrology and Testing Service Centre.
Soi 1C, Bangpoo Industrial Estate, Sukhumvit Rd., Muang, Samutprakan 10280.

Instrument Calibrated :

Description : Sound Calibrator

Manufacturer : ACO

Model : 2127

Serial No. : 130006

Ambient Environment

Temperature : $(23 + 3) ^\circ\text{C}$

Relative Humidity : $(50 \pm 15) \%$

Ambient Pressure : $(101.325 \pm 1.500) \text{ kPa}$

Standards used : 1. Digital Function Synthesizer NF Electronic DF-193A S/N 122037.
2. Measuring Amplifier Bruel&Kjaer 2636 S/N 1537484.
3. Programmable Attenuator Tamagawa TPA-303A S/N OF 2214.
4. Digital Multimeter Agilent 34401A S/N MY44005560.
5. Pressure Transmitter Vaisala PTB202AD S/N T0650001.
6. Audio Analyzer Keithley 2015-P S/N4106495.
7. Condenser Microphone B&K 4180 S/N 2889871.

Calibration Procedure: CP-102-04 based on IEC 60942-2003; The sound pressure level generated by sound calibrator under test shall be measured by standard microphone using an insert voltage technique.

This instrument has been calibrated against standards maintained at Electrical and Electronic Standards Laboratory (EEL), which are traceable to the International System of Units through the National Institute of Metrology (Thailand).

The information on actual reading is attached herewith and the uncertainty limits quoted refer to the measured values only.

Date of Receipt : 22 Feb. 2024

Date of Calibration : 4 Mar. 2024

1 / 2

The results relate only to the items tested/calibrated or value assigned.

Advertising the Report/Certificate and publicity of the results except in full are prohibited unless written permission is obtained from the governor of TISTR.

FM.BL.MTC.002 Rev.4

Head Office

35 Mu 3 Tambon Khlong Ha, Amphoe Khlong Luang,
Changwat Pathumthani 12120, Thailand

Tel. (66) 0 2577 9000

Fax. (66) 0 2577 9009

E-mail : rumpai@tistr.or.th Website:www.tistr.or.th

Office/Laboratory

Soi 1C, Bangpoo Industrial Estate, Sukhumvit Road,
Amphoe Muang, Changwat Samutprakan 10280, Thailand

Tel. (66) 0 2323 1672-80 ext. 115, 116

Fax. (66) 0 2323 9165

E-mail : mtc@tistr.or.th

Office

196 Phahonyothin Road, Chatuchak, Bangkok 10900,
Thailand

Tel. (66) 0 2579 1121-30 ext. 5219, 5225, 5217

Fax. (66) 0 2579 8592

E-mail : sumalee@tistr.or.th

Request No. 21-67/0304

MTC No. EEL. BP. 109/0267

The reported expanded uncertainty is based upon a standard uncertainty multiplied by a coverage factor $k = 2$, providing a level of confidence of approximately 95%.

Nominal Output of Unit Under Test = 94 dB re 20 μ Pa at 1000 Hz

Acoustic Output in dB re 20 μ Pa, Corrected to Reference Conditions: 101.325 kPa, 23.0 °C and 50 %RH.

1. Sound Pressure Level

Standard Microphone Type	Measured Sound Pressure Level (dB)	Deviated value (dB)	Uncertainty (dB)	Tolerance limit IEC60942:2003 Class 2
1/2 inch Bruel&Kjaer 4180	93.85	-0.15	± 0.10	± 0.75 dB

2. Frequency

Standard Microphone Type	Measured Frequency (Hz)	Deviated value (Hz)	Uncertainty (Hz)	Tolerance limit IEC60942:2003 Class 2
1/2 inch Bruel&Kjaer 4180	999.9	-0.1	± 1.5	$\pm 2.0\%$

3. Total Distortion

Standard Microphone Type	Measured Total Distortion (%)	Uncertainty (%)	Tolerance limit IEC60942:2003 Class 2
1/2 inch Bruel&Kjaer 4180	1.65	± 0.50	$\pm 4.0\%$

Note : 1. No adjustment.

2. The calibrator pressure correction was not included.

3. The microphone volume correction was not included.

Calibrated by :

...
(Mr.Weerachai Deechaiyae)

Approved by :

...
(Mr.Prawate Kluaypa)
Director

Electrical and Electronic Standards Laboratory

Industrial Metrology and Testing Service Centre

Date of Calibration : 4 Mar. 2024

Date of Issue : 5 Mar. 2024

Ref : 2011267022200795001

End of Certificate

2 / 2

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Head Office

35 Mu 3 Tambon Khlong Ha, Amphoe Khlong Luang,
Changwat Pathumthani 12120, Thailand
Tel. (66) 0 2577 9000
Fax. (66) 0 2577 9009
E-mail : rumpai@tistr.or.th Website:www.tistr.or.th

Office/Laboratory

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Amphoe Muang, Changwat Samutprakan 10280, Thailand
Tel. (66) 0 2323 1672-80 ext. 115, 116
Fax. (66) 0 2323 9165
E-mail : mtc@tistr.or.th

Office

196 Phahonyothin Road, Chatuchak, Bangkok 10900,
Thailand
Tel. (66) 0 2579 1121-30 ext. 5219, 5225, 5217
Fax. (66) 0 2579 8592
E-mail : sumalee@tistr.or.th



บริษัท เอส.พี.เอส. คอนซัลติ้ง เซอร์วิส จำกัด
S.P.S. CONSULTING SERVICE CO., LTD.
7 ซอยพหลโยธิน 24 ถนนพหลโยธิน แขวงจอมพล เขตจตุจักร กรุงเทพฯ 10900
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Tel : (662) 939-4370-72 Fax : (662) 513-4221 E-mail : sale@spscon.com, www.spscon.com

Noise B_120_1/24

Sound Level Meter Calibration Report

Acoustic Calibrator Data

Brand	ACO	Number	AC 03/56
Model	2127	Serial No.	130006
Calibration Range	94 dB, 1000 Hz	Last Calibration	04 March 2024
		Due Date	04 March 2025

Calibration Data

Sound Level Meter Data				Calibration Data		
SLM No.	Brand	Model	Serial No.	Date	Actual Reading [dB]	
					Before Adjustment	After Adjustment
ACO-B02	ACO	6236	00090370	21 April 2024	93.9	93.9
ACO-B05	ACO	6236	00142002	21 April 2024	94.0	93.9
ACO-B27	ACO	6236	00182008	21 April 2024	93.9	93.9
Acoustic Certified Value : Thailand Institute of Scientific and Technological Research (TISTR)					93.85 ± 0.10 dB	

Calibrated by :

(Mr. Adul Dangklom)

Approved by :

(Mr. Peera Detudom)



Noise B_160/24

Sound Level Meter Calibration Report

Acoustic Calibrator Data							
Brand	ACO			Number	AC 03/56		
Model	2127			Serial No.	130006		
Calibration Range	94 dB, 1000 Hz			Last Calibration	04 March 2024		
				Due Date	04 March 2025		

Calibration Data							
Sound Level Meter Data				Calibration Data			
SLM No.	Brand	Model	Serial No.	Date	Actual Reading [dB]		
					Before Adjustment	After Adjustment	
ACO-B39	ACO	6236	00222301	12 May 2024	93.9	93.9	
Acoustic Certified Value : Thailand Institute of Scientific and Technological Research (TISTR)					93.85 ± 0.10 dB		

Calibrated by :

(Mr. Adul Dangklom)

Approved by :

(Mr. Peera Detudom)



THAILAND INSTITUTE OF SCIENTIFIC AND TECHNOLOGICAL RESEARCH (TISTR)

Request No. 21-66/0639

MTC No. EEL. BP. 40/0866

CALIBRATION CERTIFICATE

Submitted by : S.P.S Consulting Services Co.,Ltd.

Address : 7 Soi Phaholyothin 24, Phaholyothin Road, Jompol, Chatuchak, Bangkok 10900.

Calibrated at : Electrical and Electronic Standards Laboratory, Industrial Metrology and Testing Service Centre.
: Soi 1C, Bangpoo Industrial Estate, Sukhumvit Rd., Muang, Samutprakan 10280.

Instrument Calibrated :

Description : Sound Calibrator

Manufacturer : SVANTEK

Model : SV34

Serial No. : 83820

Ambient Environment

Temperature : $(23 \pm 3) ^\circ\text{C}$

Relative Humidity : $(50 \pm 15) \%$

Ambient Pressure : $(101.325 \pm 1.500) \text{ kPa}$

Standards used : 1. Digital Function Synthesizer NF Electronic DF-193A S/N 122037.

2. Measuring Amplifier Bruel&Kjaer 2636 S/N 1537484.

3. Programmable Attenuator Tamagawa TPA-303A S/N OF 2214.

4. Digital Multimeter Agilent 34401A S/N MY44005560.

5. Pressure Transmitter Vaisala PTB202AD S/N T0650001.

6. Audio Analyzer Panasonic VP-7722A S/N 041477D122.

7. Condenser Microphone Bruel&Kjaer 4180 S/N 2633526.

Calibration Procedure: CP-102-04 based on IEC 60942-2003. The sound pressure level of instrument was measured by standard microphone using an insert voltage technique.

This instrument has been calibrated against standards maintained at Electrical and Electronic Standards Laboratory (EEL), which are traceable to the International System of Units through the National Institute of Metrology (Thailand).

The information on actual reading is attached herewith and the uncertainty limits quoted refer to the measured values only.

Date of Receipt : 11 Aug. 2023

Date of Calibration : 22 Aug. 2023

1 / 2

The results relate only to the items tested/calibrated or value assigned.

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FM.BL.MTC.002 Rev.4

Head Office

35 Mu 3 Tambon Khlong Ha, Amphoe Khlong Luang,
Changwat Pathumthani 12120, Thailand

Tel. (66) 0 2577 9000

Fax. (66) 0 2577 9009

E-mail : rumpai@tistr.or.th Website:www.tistr.or.th

Office/Laboratory

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Amphoe Muang, Changwat Samutprakan 10280, Thailand

Tel. (66) 0 2323 1672-80 ext. 115, 116

Fax. (66) 0 2323 9165

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Office

196 Phahonyothin Road, Chatuchak, Bangkok 10900,
Thailand

Tel. (66) 0 2579 1121-30 ext. 5219, 5225, 5217

Fax. (66) 0 2579 8592

E-mail : sumalee@tistr.or.th

Request No. 21-66/0639

MTC No. EEL. BP. 40/0866

The reported expanded uncertainty is based upon a standard uncertainty multiplied by a coverage factor $k = 2$, providing a level of confidence of approximately 95%.

Nominal Output of Unit Under Test = 114 dB re 20 μ Pa at 1000 Hz

Acoustic Output in dB re 20 μ Pa , Corrected to Reference Conditions : 101.325 kPa , 23.0°C and 50 %RH

1. Sound Pressure Level

Standard Microphone Type	Measured Sound Pressure Level (dB)	Deviated value (dB)	Uncertainty (dB)	Tolerance limit IEC60942:2003 Class 2
1/2 inch Bruel&Kjaer 4180	114.01	0.01	± 0.10	± 0.75 dB

2. Frequency

Standard Microphone Type	Measured Frequency (Hz)	Deviated value (Hz)	Uncertainty (Hz)	Tolerance limit IEC60942:2003 Class 2
1/2 inch Bruel&Kjaer 4180	1000.0	0.0	± 1.5	$\pm 2.0\%$

3. Total distortion

Standard Microphone Type	Measured Total distortion (%)	Uncertainty (%)	Tolerance limit IEC60942:2003 Class 2
1/2 inch Bruel&Kjaer 4180	0.19	± 0.50	$\pm 4.0\%$

Note : 1. No adjustment.

2. The calibrator pressure correction was not included.

3. The microphone volume correction was not included.

Calibrated by :

.....
(Mr. Weerachai Deechaiyae)

Approved by :

.....
(Mr. Prawate Kluaypa)
Director
TISTR

Electrical and Electronic Standards Laboratory

Industrial Metrology and Testing Service Centre

Date of Calibration : 22 Aug. 2023

Date of Issue : 24 Aug. 2023

Ref : 2011266081103146003

End of Certificate

2 / 2

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Head Office

35 Mu 3 Tambon Khlong Ha, Amphoe Khlong Luang,
Changwat Pathumthani 12120, Thailand
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Office/Laboratory

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Amphoe Muang, Changwat Samutprakan 10280, Thailand
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S.P.S. CONSULTING SERVICE CO., LTD.
7 ซอยพหลโยธิน 24 ถนนพหลโยธิน แขวงจตุจักร กรุงเทพฯ 10900
7 Soi Phaholyothin 24, Phaholyothin Rd., Jompol, Chulachak Bangkok 10900
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Noise B_047_1/24

Noise Dose Meter Calibration Report

Acoustic Calibrator Data

Brand	SVANTEK	Number	SV 03/60
Model	SV34	Serial No.	83820
Calibration Range	114 dB, 1000 Hz	Last Calibration	22 August 2023
		Due Date	22 August 2024

Calibration Data

Sound Level Meter Data				Calibration Data		
SLM No.	Brand	Model	Serial No.	Date	Actual Reading [dB]	
					Before Adjustment	After Adjustment
NMD-B09	SVANTEK	SV-104IS	80829	17 February 2024	114.0	114.0
NMD-R10	SVANTEK	SV-104IS	60150	17 February 2024	114.0	114.0
NMD-R11	SVANTEK	SV-104IS	63435	17 February 2024	114.0	114.0
NMD-R21	SVANTEK	SV-104IS	80800	17 February 2024	114.0	114.0
Acoustic Certified Value : Thailand Institute of Scientific and Technological Research (TISTR)					114.01± 0.10 dB	

Calibrated by :

(Mr. Adul Dangklom)

Approved by :

(Mr. Peera Detudom)

ปริมาณเสียงสะสมแบบติดตัวบุคคล



THAILAND INSTITUTE OF SCIENTIFIC AND TECHNOLOGICAL RESEARCH (TISTR)

Request No. 21-66/0639

MTC No. EEL. BP. 40/0866

CALIBRATION CERTIFICATE

Submitted by : S.P.S Consulting Services Co.,Ltd.

Address : 7 Soi Phaholyothin 24, Phaholyothin Road, Jompol, Chatuchak, Bangkok 10900.

Calibrated at : Electrical and Electronic Standards Laboratory, Industrial Metrology and Testing Service Centre.
: Soi 1C, Bangpoo Industrial Estate, Sukhumvit Rd., Muang, Samutprakan 10280.

Instrument Calibrated :

Description : Sound Calibrator

Manufacturer : SVANTEK

Model : SV34

Serial No. : 83820

Ambient Environment

Temperature : $(23 \pm 3) ^\circ\text{C}$

Relative Humidity : $(50 \pm 15) \%$

Ambient Pressure : $(101.325 \pm 1.500) \text{ kPa}$

Standards used : 1. Digital Function Synthesizer NF Electronic DF-193A S/N 122037.
2. Measuring Amplifier Bruel&Kjaer 2636 S/N 1537484.
3. Programmable Attenuator Tamagawa TPA-303A S/N OF 2214.
4. Digital Multimeter Agilent 34401A S/N MY44005560.
5. Pressure Transmitter Vaisala PTB202AD S/N T0650001.
6. Audio Analyzer Panasonic VP-7722A S/N 041477D122.
7. Condenser Microphone Bruel&Kjaer 4180 S/N 2633526.

Calibration Procedure: CP-102-04 based on IEC 60942-2003. The sound pressure level of instrument was measured by standard microphone using an insert voltage technique.

This instrument has been calibrated against standards maintained at Electrical and Electronic Standards Laboratory (EEL), which are traceable to the International System of Units through the National Institute of Metrology (Thailand).

The information on actual reading is attached herewith and the uncertainty limits quoted refer to the measured values only.

Date of Receipt : 11 Aug. 2023

Date of Calibration : 22 Aug. 2023

1 / 2

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FM.BL.MTC.002 Rev.4

Head Office

35 Mu 3 Tambon Khlong Ha, Amphoe Khlong Luang,
Changwat Pathumthani 12120, Thailand
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Office/Laboratory

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Amphoe Muang, Changwat Samutprakan 10280, Thailand
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Fax. (66) 0 2579 8592
E-mail : sumalee@tistr.or.th

Request No. 21-66/0639

MTC No. EEL. BP. 40/0866

The reported expanded uncertainty is based upon a standard uncertainty multiplied by a coverage factor $k = 2$, providing a level of confidence of approximately 95%.

Nominal Output of Unit Under Test = 114 dB re 20 μ Pa at 1000 Hz

Acoustic Output in dB re 20 μ Pa , Corrected to Reference Conditions : 101.325 kPa , 23.0°C and 50 %RH

1. Sound Pressure Level

Standard Microphone Type	Measured Sound Pressure Level (dB)	Deviated value (dB)	Uncertainty (dB)	Tolerance limit IEC60942:2003 Class 2
1/2 inch Bruel&Kjaer 4180	114.01	0.01	± 0.10	± 0.75 dB

2. Frequency

Standard Microphone Type	Measured Frequency (Hz)	Deviated value (Hz)	Uncertainty (Hz)	Tolerance limit IEC60942:2003 Class 2
1/2 inch Bruel&Kjaer 4180	1000.0	0.0	± 1.5	$\pm 2.0\%$

3. Total distortion

Standard Microphone Type	Measured Total distortion (%)	Uncertainty (%)	Tolerance limit IEC60942:2003 Class 2
1/2 inch Bruel&Kjaer 4180	0.19	± 0.50	$\pm 4.0\%$

Note : 1. No adjustment.

2. The calibrator pressure correction was not included.

3. The microphone volume correction was not included.

Calibrated by :

...

(Mr. Weerachai Deechaiyae)

Approved by :

...

(Mr. Prawate Kluaypa)

Director
TISTR

Electrical and Electronic Standards Laboratory

Industrial Metrology and Testing Service Centre

Date of Calibration : 22 Aug. 2023

Date of Issue : 24 Aug. 2023

Ref : 2011266081103146003

End of Certificate

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Head Office

35 Mu 3 Tambon Khlong Ha, Amphoe Khlong Luang,
Changwat Pathumthani 12120, Thailand
Tel. (66) 0 2577 9000
Fax. (66) 0 2577 9009
E-mail : rumpai@tistr.or.th Website:www.tistr.or.th

Office/Laboratory

Soi 1C, Bangpoo Industrial Estate, Sukhumvit Road,
Amphoe Muang, Changwat Samutprakan 10280, Thailand
Tel. (66) 0 2323 1672-80 ext. 115, 116
Fax. (66) 0 2323 9165
E-mail : mtc@tistr.or.th

Office

196 Phahonyothin Road, Chatuchak, Bangkok 10900,
Thailand
Tel. (66) 0 2579 1121-30 ext. 5219, 5225, 5217
Fax. (66) 0 2579 8592
E-mail : sumalee@tistr.or.th



บริษัท เอส.พี.เอส. คอนซัลติ้ง เซอร์วิส จำกัด
S.P.S. CONSULTING SERVICE CO., LTD.
7 ซอยพหลโยธิน 24 ถนนพหลโยธิน แขวงจอมพล เขตจตุจักร กรุงเทพฯ 10900
7 Soi Phaholyothin 24, Phaholyothin Rd., Jompol, Chatuchak, Bangkok 10900
Tel : (662) 939-4370-72 Fax : (662) 513-4221 E-mail : sale@spscon.com.. www.spscon.com

Noise Dose B_048/24

Noise Dose Meter Calibration Report

Acoustic Calibrator Data						
Brand	SVANTEK			Number	SV 03/60	
Model	SV34			Serial No.	83820	
Calibration Range	114 dB, 1000 Hz			Last Calibration	22 August 2023	
				Due Date	22 August 2024	
Calibration Data						
Sound Level Meter Data				Calibration Data		
SLM No.	Brand	Model	Serial No.	Date	Actual Reading [dB]	
					Before Adjustment	After Adjustment
NMD-B06	SVANTEK	SV-104IS	80816	17 February 2024	114.0	114.0
NMD-B09	SVANTEK	SV-104IS	80829	17 February 2024	114.0	114.0
NMD-B10	SVANTEK	SV-104IS	80830	17 February 2024	114.0	114.0
NMD-R16	SVANTEK	SV-104IS	63441	17 February 2024	114.0	114.0
Acoustic Certified Value : Thailand Institute of Scientific and Technological Research (TISTR)					114.01± 0.10 dB	

Calibrated by :

(Mr. Adul Dangklom)

Approved by :

(Mr. Peera Detudom)



บริษัท เอส.พี.เอส. คอนซัลติ้ง เซอร์วิส จำกัด

S.P.S. CONSULTING SERVICE CO., LTD.

7 ซอยพหลโยธิน 24 ถนนพหลโยธิน แขวงจตุจักร เขตจตุจักร กรุงเทพฯ 10900

7 Sol Phaholyothin 24, Phaholyothin Rd., Jompol, Chatuchak, Bangkok 10900

Tel : (662) 939-4370-72 Fax : (662) 513-4221 E-mail : sale@spscon.com, www.spscon.com

Noise Dose B_120/24

Noise Dose Meter Calibration Report

Acoustic Calibrator Data

Brand	SVANTEK	Number	SV 03/60
Model	SV34	Serial No.	83820
Calibration Range	114 dB, 1000 Hz	Last Calibration	22 August 2023
		Due Date	22 August 2024

Calibration Data

Sound Level Meter Data					Calibration Data	
SLM No.	Brand	Model	Serial No.	Date	Actual Reading [dB]	
					Before Adjustment	After Adjustment
NMD-B13	SVANTEK	SV-104IS	80834	21 April 2024	113.9	114.0
NMD-B14	SVANTEK	SV-104IS	80875	21 April 2024	114.0	114.0
NMD-B15	SVANTEK	SV-104IS	80880	21 April 2024	114.0	114.0
Acoustic Certified Value : Thailand Institute of Scientific and Technological Research (TISTR)					114.01± 0.10 dB	

Calibrated by :

(Mr. Adul Dangklom)

Approved by :

(Mr. Peera Detudom)



THAILAND INSTITUTE OF SCIENTIFIC AND TECHNOLOGICAL RESEARCH (TISTR)

Request No. 21-66/0639

MTC No. EEL. BP. 39/0866

CALIBRATION CERTIFICATE

Submitted by : S.P.S Consulting Services Co.,Ltd.

Address : 7 Soi Phaholyothin 24, Phaholyothin Road, Jompol, Chatuchak, Bangkok 10900.

Calibrated at : Electrical and Electronic Standards Laboratory, Industrial Metrology and Testing Service Centre.

: Soi 1C, Bangpoo Industrial Estate, Sukhumvit Rd., Muang, Samutprakan 10280.

Instrument Calibrated :

Description : Sound Calibrator

Manufacturer : SVANTEK

Model : SV34

Serial No. : 33137

Ambient Environment

Temperature : $(23 \pm 3) ^\circ\text{C}$

Relative Humidity : $(50 \pm 15) \%$

Ambient Pressure : $(101.325 \pm 1.500) \text{ kPa}$

Standards used : 1. Digital Function Synthesizer NF Electronic DF-193A S/N 122037.

2. Measuring Amplifier Bruel&Kjaer 2636 S/N 1537484.

3. Programmable Attenuator Tamagawa TPA-303A S/N OF 2214.

4. Digital Multimeter Agilent 34401A S/N MY44005560.

5. Pressure Transmitter Vaisala PTB202AD S/N T0650001.

6. Audio Analyzer Panasonic VP-7722A S/N 041477D122.

7. Condenser Microphone Bruel&Kjaer 4180 S/N 2633526.

Calibration Procedure: CP-102-04 based on IEC 60942-2003. The sound pressure level of instrument was measured by standard microphone using an insert voltage technique.

This instrument has been calibrated against standards maintained at Electrical and Electronic Standards Laboratory (EEL), which are traceable to the International System of Units through the National Institute of Metrology (Thailand).

The information on actual reading is attached herewith and the uncertainty limits quoted refer to the measured values only.

Date of Receipt : 11 Aug. 2023

Date of Calibration : 22 Aug. 2023

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FM.BL.MTC.002 Rev.4

Head Office

35 Mu 3 Tambon Khlong Ha, Amphoe Khlong Luang,
Changwat Pathumthani 12120, Thailand

Tel. (66) 0 2577 9000

Fax. (66) 0 2577 9009

E-mail : rumpai@tistr.or.th Website:www.tistr.or.th

Office/Laboratory

Soi 1C, Bangpoo Industrial Estate, Sukhumvit Road,
Amphoe Muang, Changwat Samutprakan 10280, Thailand

Tel. (66) 0 2323 1672-80 ext. 115, 116

Fax. (66) 0 2323 9165

E-mail : mtc@tistr.or.th

Office

196 Phahonyothin Road, Chatuchak, Bangkok 10900,
Thailand

Tel. (66) 0 2579 1121-30 ext. 5219, 5225, 5217

Fax. (66) 0 2579 8592

E-mail : sumalee@tistr.or.th

THAILAND INSTITUTE OF SCIENTIFIC AND TECHNOLOGICAL RESEARCH (TISTR)

Request No. 21-66/0639

MTC No. EEL. BP. 39/0866

The reported expanded uncertainty is based upon a standard uncertainty multiplied by a coverage factor $k = 2$, providing a level of confidence of approximately 95%.

Nominal Output of Unit Under Test = 114 dB re 20 μ Pa at 1000 Hz

Acoustic Output in dB re 20 μ Pa, Corrected to Reference Conditions : 101.325 kPa, 23.0°C and 50 %RH

1. Sound Pressure Level

Standard Microphone Type	Measured Sound Pressure Level (dB)	Deviated value (dB)	Uncertainty (dB)	Tolerance limit IEC60942:2003 Class 2
1/2 inch Bruel&Kjaer 4180	113.53	-0.47	± 0.10	± 0.75 dB

2. Frequency

Standard Microphone Type	Measured Frequency (Hz)	Deviated value (Hz)	Uncertainty (Hz)	Tolerance limit IEC60942:2003 Class 2
1/2 inch Bruel&Kjaer 4180	1000.0	0.0	± 1.5	$\pm 2.0\%$

3. Total distortion

Standard Microphone Type	Measured Total distortion (%)	Uncertainty (%)	Tolerance limit IEC60942:2003 Class 2
1/2 inch Bruel&Kjaer 4180	0.39	± 0.50	$\pm 4.0\%$

Note : 1. No adjustment.

2. The calibrator pressure correction was not included.

3. The microphone volume correction was not included.

Calibrated by :

.....
(Mr. Weerachai Deechaiyae)

Approved by :

.....
(Mr. Prawate Kluaypa)
Director

Electrical and Electronic Standards Laboratory
Industrial Metrology and Testing Service Centre

Date of Calibration : 22 Aug. 2023

Date of Issue : 24 Aug. 2023

Ref : 2011266081103146002

End of Certificate

2 / 2

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Tel : (662) 939-4370-72 Fax : (662) 513-4221 E-mail : sale@spscon.com, www.spscon.com

Noise Dose B_160_1/24

Noise Dose Meter Calibration Report

Acoustic Calibrator Data

Brand	SVANTEK	Number	SV 01/60
Model	SV34	Serial No.	33137
Calibration Range	114 dB, 1000 Hz	Last Calibration	22 August 2023
		Due Date	22 August 2024

Calibration Data

Sound Level Meter Data				Calibration Data		
SLM No.	Brand	Model	Serial No.	Date	Actual Reading [dB]	
					Before Adjustment	After Adjustment
NMD-B20	SVANTEK	SV-104IS	63441	12 May 2024	113.5	113.5
Acoustic Certified Value : Thailand Institute of Scientific and Technological Research (TISTR)					113.53± 0.10 dB	

Calibrated by :

(Mr. Adul Dangklom)

Approved by :

(Mr. Peera Detudom)