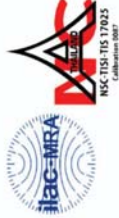


ภาคผนวกที่ 4

สรุปเอกสารสอบเทียบอุปกรณ์เครื่องมือ

เอกสารการสอบเทียบเครื่องมือตรวจวัดคุณภาพน้ำ



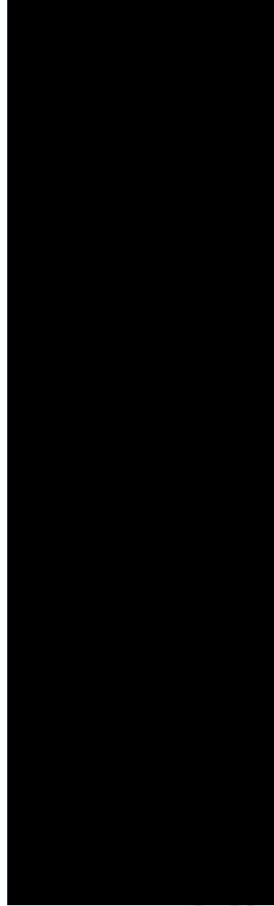
Certificate of Calibration

Equipment: Electronic Balance
Manufacturer: Sartorius
Model: QUINTIX 224-1S
Serial No.: 0035009070
ID No.: CH-01-002
Condition of the item: Normal

Customer: C.E.M Technology (Thailand) Co., Ltd.
219/43 Moo 12 Petchkasem Road, Omnoi,
Krathum Baen, Samut Sakhon 74130 Thailand

Environment Condition: Temperature 21 °C ± 0.5 °C
Relative Humidity 44 % ± 1.7 %
Calibration Place: C.E.M Technology (Thailand) Co., Ltd. (หนองปรือ)
219/43 Moo 12 Petchkasem Road, Omnoi,
Krathum Baen, Samut Sakhon 74130 Thailand

Calibration By: Mr. Wasan Nuchnabee
Calibration Date: 11 June 2026
The Method Used: In-house method, CAL-WI-47, based on UKAS Lab 14
Traceability: This certificate is traceable to the SI Units maintained by National Institute of Metrology (NIMT), Thailand through DKSH Technology Co., Ltd. Certificate No. C02260345



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DKSH Technology Limited
2533 สุขุมวิท เขตปทุมวัน กรุงเทพฯ 10260
2533 Sukhumvit Road, Bangkok, Prakhonong, Bangkok 10260
Phone: +66 2639 7000 Email: info.calibration@dksh.com Website: www.dksh.com/scientific-thailand

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Calibration Results: Without Adjustment

Eccentric Error: Weight to be 1/3 or 1/2 of Maximum capacity, taken from the center of the pan as a zero reference.

Nominal Test Value	Reference Points (mg)				
	A	B	C	D	E
-		0.0	0.0	-0.1	-0.1

Repeatability: Determination of the standard deviation of weighing balance., Readability 0.1 (mg)

Nominal test value (mg)	Standard Deviation
20000	0.04
200000	0.04

Error of indication from nominal or conventional mass value., Readability 0.1 (mg)

Nominal Value (mg)	Conventional Mass (mg)	Displayed Value (mg)	Error of indication (mg)	Uncertainty (± mg)	k
Unload	0.00	0.0	0.0	0.096	2.02
100	100.00	100.0	0.0	0.096	2.02
200	200.00	200.0	0.0	0.096	2.02
500	500.00	500.0	0.0	0.097	2.02
1000	1000.01	1000.0	0.0	0.097	2.02
2000	2000.02	2000.0	0.0	0.098	2.02
5000	5000.01	5000.0	0.0	0.099	2.02
10000	10000.01	10000.0	0.0	0.10	2.02
20000	20000.00	20000.0	0.0	0.11	2.01
50000	50000.00	50000.0	0.0	0.12	2.01
100000	99999.91	100000.0	0.1	0.17	2.00
200000	199999.87	200000.0	0.1	0.29	2.00

The End of Certificate

บริษัท ดีเคเอส อีเซีย จำกัด
DKSH Technology Limited
2533 สุขุมวิท เขตปทุมวัน กรุงเทพฯ 10260
2533 Sukhumvit Road, Bangkok, Prakhonong, Bangkok 10260
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ใบตรวจสอบสภาพเครื่องชั่ง Electronic Balance Checklist

Equipment: Electronic Balance
Model: QUINTIX 224-1S
Serial No.: 0035009070
Certificate No.: C01261658
Job No.: WO-00124610

Check date		รายการตรวจเช็ค (Description)	Check before delivery		หมายเหตุ (Remark)
11 Jun 2026			11 Jun 2026		
(Normal)	(Defective)		(Normal)	(Defective)	
		General			
☒	☐	1. สายไฟ/ อะแดปเตอร์ (Electrical wire/ Adaptor)	☒	☐	
☒	☐	2. ความสมบูรณ์ชุดกระงกกันลม (Cover)	☒	☐	
☒	☐	3. ความสมบูรณ์ของระดับน้ำ (Bubble spirit level)	☒	☐	
☒	☐	4. ความสมบูรณ์ของชุดขาตั้งเครื่อง (Leveling foot)	☒	☐	
☒	☐	5. การตอบสนองของปุ่มกด (Keys)	☒	☐	
☒	☐	6. ความสมบูรณ์ของหน้าจอ (Display)	☒	☐	
☒	☐	7. การแสดงผลของหน้าจอ (Screen display)	☒	☐	
☒	☐	8. ชุดรองจานชั่ง (Stopper/ Pan support)	☒	☐	
☒	☐	9. การทำงานของฟังก์ชัน (Internal/ External Function)	☒	☐	
☒	☐	10. ความสะอาดของตัวเครื่องภายนอก (External cleanliness of the balance)	☒	☐	
☒	☐	11. สภาพแวดล้อม ณ สถานที่ตั้งเครื่องชั่ง (Environment at the location of the balance)	☒	☐	

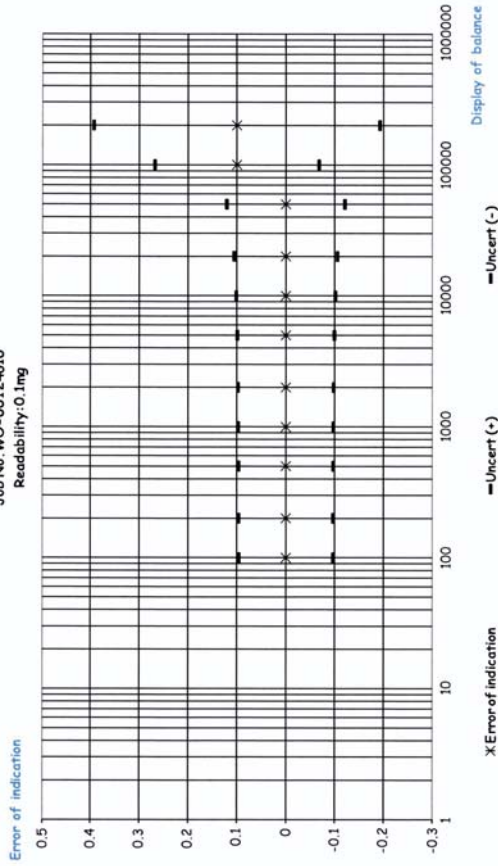
ข้อแนะนำ/ Note :

Mr. Wasan Nuchabee
Service Engineer

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DKSH Technology Limited
2533 สุขุมวิท แขวงคลองเตย เขตคลองเตย กรุงเทพมหานคร 10260
2533 Sukhumvit Road, Bangkok, Prachinong, Bangkok 10260
Phone: +66 2639 7000 Email: info.calibration@dksh.com Website: www.dksh.com/scientific-thailand

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Without Adjustment
Job No. WO-00124610
Readability: 0.1mg



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2533 Sukhumvit Road, Bangkok, Prachinong, Bangkok 10260
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THAI CALIBRATION SERVICES CO., LTD.
19/8 Moo 9 Soi Raikhang 30, Phuthamonthon 5 Rd., Raikhang,
Samphran, Nakhonpathom 73210 Tel. 0-3439-7682-5, 08-6341-8613
www.thaicall.com E-mail : sales@thaicalibration.com, lab@thaicalibration.com



NSC-TISI-TIS 17025
CALIBRATION 0189

CALIBRATION CERTIFICATE

Certificate No.S2602960S

page 1 of 2

Customer :

C.E.M TECHNOLOGY (THAILAND) CO., LTD.

219/43 Moo 12 Petchkasem Road, Omnoi,

Krathumban, Samutsakorn 74130

Equipment :

Non-automatic weighing instrument (Electronic instrument)

Manufacturer :

Sartorius

Model :

BSA224S-CW

Accuracy class :

-

Capacity :

220 g

Resolution :

0.0001 g

Serial No. :

3139614148

ID No. :

CI-01-003

Place of calibration :

หจก.ซีเอ็ม เทคโนโลยี

Order No. :

69S0915-1

Ambient temperature :

(25.1 ± 5.0) °C

Relative humidity :

(52.5 ± 10.0) %

Received date :

27-Feb-2026

Date of calibration :

27-Feb-2026

Date of issue :

02-Mar-2026

Condition of the balance :

Good working conditions

Calibration method

This instrument was calibrated according to the EURAMET Calibration Guide No. 18.

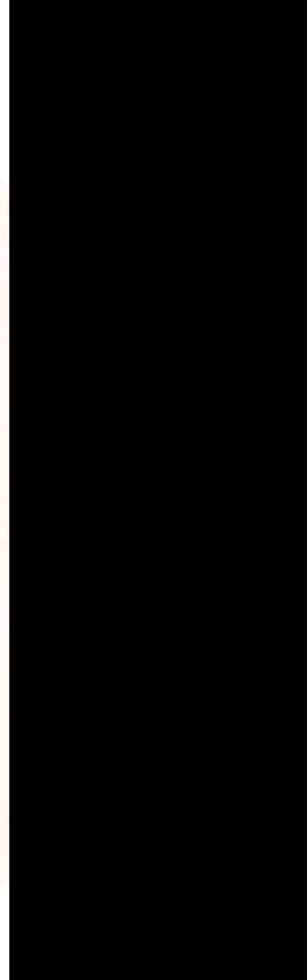
Condition of reference standard weight

Instrument	Nominal value	Serial No.	Certificate No.	Due-date	Density (kg/m ³)
1 Standard weight set	1 mg to 2 kg	10003101+0694	M2512001S	10-Dec-2026	7950

Traceability of the reference standard weight

The measurement results are traceable to the International System of Units (SI) through Mass Calibration Laboratory

Thai Calibration Services Co., Ltd., NSC-ONSC accredited no. Calibration 0189.



THAI CALIBRATION SERVICES CO., LTD.
19/8 Moo 9 Soi Raikhang 30, Phuthamonthon 5 Rd., Raikhang,
Samphran, Nakhonpathom 73210 Tel. 0-3439-7682-5, 08-6341-8613
www.thaicall.com E-mail : sales@thaicalibration.com, lab@thaicalibration.com



NSC-TISI-TIS 17025
CALIBRATION 0189

CALIBRATION CERTIFICATE

Certificate No.S2602960S

page 2 of 2

The repeatability of indication

Nominal Value (g)	Standard Deviation of reading (g)	Maximum difference between successive reading (g)	n
200	0.00004	0.0001	5

The effect of eccentric application of a load on the indication (test load : 100 g)

Position	Balance Reading (g)
Point 1	100.0000
Point 2	100.0001
Point 3	100.0001
Point 4	99.9999
Point 5	100.0000
Eccentric Value	0.0001



The error of indication

Nominal Value (g)	Value of Reference Standard Weight (g)	Balance Reading (g)	Correction (g)	Uncertainty (±) (g)	k
Unload	0.0000	0.0000	0.0000	0.00013	2.37
1	1.0000	1.0000	0.0000	0.00014	2.20
2	2.0000	2.0000	0.0000	0.00014	2.20
5	5.0000	4.9999	+0.0001	0.00014	2.18
10	10.0000	9.9999	+0.0001	0.00014	2.17
20	20.0000	20.0000	0.0000	0.00015	2.14
50	50.0000	50.0001	-0.0001	0.00015	2.11
100	100.0000	100.0000	0.0000	0.00018	2.04
120	120.0000	120.0001	-0.0001	0.00022	2.00
150	150.0001	150.0003	-0.0002	0.00024	2.00
200	200.0001	200.0003	-0.0002	0.00027	2.00

Remark : Adjustment, Internal weight

Uncertainty of measurement

The reported expanded uncertainty of measurement is stated as the standard uncertainty of measurement multiplied by the coverage factor (k), which for a normal distribution corresponds to a coverage probability of approximately 95% (confidence level).

This report will certify of the calibrated equipment only.

--End--



Certificate of Calibration



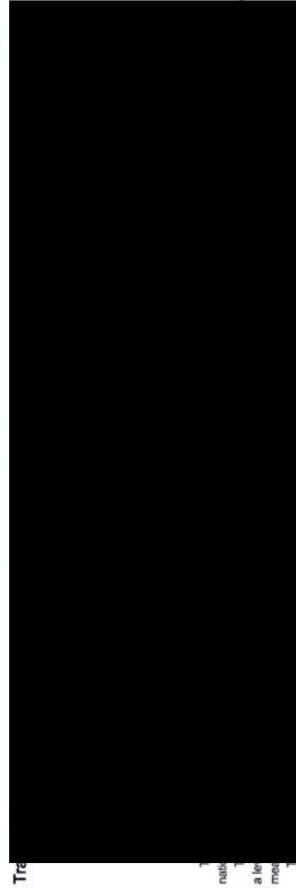
Equipment: Electronic Thermo-Hygrometer
Manufacturer: testo
Model: testo 608-H1
Serial No.: 45186322
ID No.: CH-02-003
Condition of the item: Normal
Customer: C.E.M Technology (Thailand) Co., Ltd.
219/43 Moo 12 Petchkasem Road,
Omnoi Krathum Baen, Samut Sakhon 74130 Thailand

Environment Condition: Temperature: 22 °C ± 3 °C
Relative Humidity: 50 % ± 20 %
Voltage: 220 VAC ± 10 %

Calibration Place: Thermo-Hygro Laboratory, DKSH Technology Limited.
2533 Sukhumvit Road, Bangkok,
Phrakhanong, Bangkok 10260 Thailand

Calibration By: Mr. Tweewong Thaihiang
Calibration Date: 26 May 2026

The Method Used: In house method, CAL-WI-42, by comparison with standard thermometer and standard hygrometer



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Phone: +66 2639 7000 Email: info.calibration@dksh.com Website: www.dksh.com/scientific-thailand

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CAL-FM-C19-12: 30 Jun 2025



Certificate No. : C19262637
Page: 2 of 2

Reference Standard Equipment:

Equipment Name	Certificate No.	Cal. Date	Next Cal. Date
Digital Thermometer With Probe	C15251384	24 December 2025	24 December 2026
Digital Thermo Hygrometer With Probe	QR26-0370	21 January 2026	21 January 2027

Calibration Results:

Function Temperature: Without adjustment

Calibrate Point (°C)	STD. Reading (°C)	UUC. Reading (°C)	Correction (°C)	Uncertainty (± °C)
15.0	15.011	15.2	-0.189	0.26
20.0	20.003	20.2	-0.197	0.26
25.0	25.008	25.2	-0.192	0.26
30.0	30.006	29.8	0.206	0.26

Function Relative Humidity: Without adjustment

Reference Temp. (°C)	Calibrate Point. (%RH)	STD. Reading (%RH)	UUC. Reading (%RH)	Correction (%RH)	Uncertainty (± %RH)
25.00	20.0	20.08	25.3	-5.22	1.1
25.00	30.0	29.99	35.4	-5.41	1.1
25.00	40.0	40.02	45.7	-5.68	1.3
25.00	50.0	50.05	55.7	-5.65	1.3

The End of Certificate

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CAL-FM-C19-12: 30 Jun 2025



ใบตรวจสอบสภาพเครื่องมือวัดอุณหภูมิ (Thermo-Hygrometer Checklist)

Equipment : Electronic Thermo-Hygrometer

Serial No. : 45186322

Certificate No. : C19262637

Model : testo 608-H1

Check Date		รายการตรวจเช็ค		Check before delivery		หมายเหตุ (Remark)
26 May 2026				26 May 2026		
Normal	Defective	General		Normal	Defective	
☐	☐	1. สายไฟ (Electric wire)		☐	☐	ไม่มี
☐	☐	2. การทำงาน (On/Off Switch)		☐	☐	ไม่มี
☒	☐	3. การทำงานปุ่มกดต่างๆ (Selector Key)		☒	☐	
☒	☐	4. การแสดงผลหน้าจอ (Display)		☒	☐	
☒	☐	5. แบตเตอรี่ (Battery)		☒	☐	
☒	☐	6. สภาพตัวเครื่อง (Equipment Body)		☒	☐	
☐	☐	7. หัววัดเซ็นเซอร์ (Sensor External)		☐	☐	ไม่มี
☒	☐	8. ฝาปิดแบตเตอรี่ (Battery cover)		☒	☐	

Note :

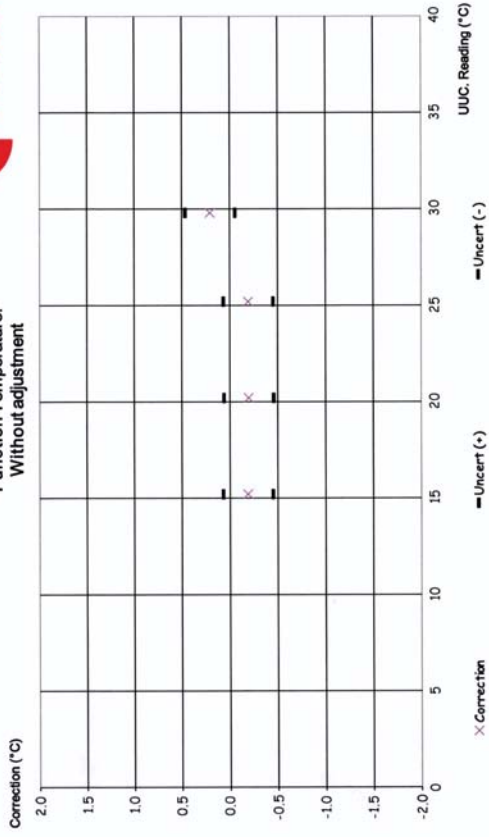
Mr. Tweepong Thaitiang
Service Engineer

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DKSH Technology Limited
2533 Sukhumvit Road, Bangkok, Prachinankong, Bangkok 10260
Phone : +66 2639 7000 Email : info.calibration@dksh.com Website : www.dksh.com/scientific-thailand

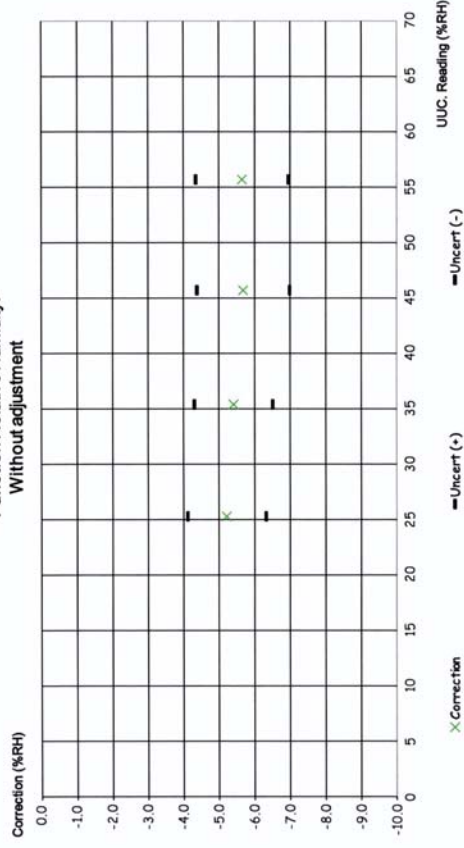
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C19262637 Function Temperature: Without adjustment



C19262637 Function Relative Humidity: Without adjustment



Delivering Growth - In Asia and Beyond.



Certificate of Calibration



Equipment: Electronic Thermo-Hygrometer
Manufacturer: testo
Model: testo 608-H1
Serial No.: 45186324
ID No.: CI-02-004
Condition of the item: Normal

Customer: C.E.M Technology (Thailand) Co., Ltd.
219/43 Moo 12 Petchkasem Road,
Omnoi Krathum Baen, Samut Sakhon 74130 Thailand

Environment Condition: Temperature: 22 °C ± 3 °C
Relative Humidity: 50 % ± 20 %
Voltage: 220 VAC ± 10 %

Calibration Place: Thermo-Hygro Laboratory, DKSH Technology Limited.
2533 Sukhumvit Road, Bangchak,
Phrakhanong, Bangkok 10260 Thailand

Calibration By: Mr. Tweewong Thaitiang
Calibration Date: 26 May 2026

The Method Used: In house method, CAL-WI-42, by comparison with standard thermometer and standard hygrometer
Traceability: This certificate is traceable to the International System of Unit maintained by:



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DKSH Technology Limited
2533 สุขุมวิท ถนน, กรุงเทพฯ 10260
2533 Sukhumvit Road, Bangkok 10260
Phone: +66 2639 7000 Email: info.calibration@dksh.com Website: www.dksh.com/scientific-thailand

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CAL-FM-C19-12: 30 Jun 2025



Certificate No. : C19262638
Page: 2 of 2

Reference Standard Equipment:

Equipment Name	Certificate No.	Cal. Date	Next Cal. Date
Digital Thermometer With Probe	C15251384	24 December 2025	24 December 2026
Digital Thermo Hygrometer With Probe	QR26-0370	21 January 2026	21 January 2027

Calibration Results:

Function Temperature: Without adjustment

Calibrate Point. (°C)	STD. Reading (°C)	UUC. Reading (°C)	Correction (°C)	Uncertainty (± °C)
15.0	15.011	15.1	-0.089	0.26
20.0	20.003	20.2	-0.197	0.26
25.0	25.008	25.2	-0.192	0.26
30.0	30.006	29.9	0.106	0.26

Function Relative Humidity: Without adjustment

Reference Temp. (°C)	Calibrate Point. (%RH)	STD. Reading (%RH)	UUC. Reading (%RH)	Correction (%RH)	Uncertainty (± %RH)
25.00	20.0	20.08	25.7	-5.62	1.1
25.00	30.0	29.99	35.7	-5.71	1.1
25.00	40.0	40.02	45.7	-5.68	1.3
25.00	50.0	50.05	55.6	-5.55	1.3

The End of Certificate

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DKSH Technology Limited
2533 สุขุมวิท ถนน, กรุงเทพฯ 10260
2533 Sukhumvit Road, Bangkok 10260
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CAL-FM-C19-12: 30 Jun 2025



ใบตรวจสอบสภาพเครื่องมือวัดอุณหภูมิ
(Thermo-Hygrometer Checklist)

Equipment : Electronic Thermo-Hygrometer

Serial No. : 45186324

Certificate No. : C19262638

Model : testo 608-H1

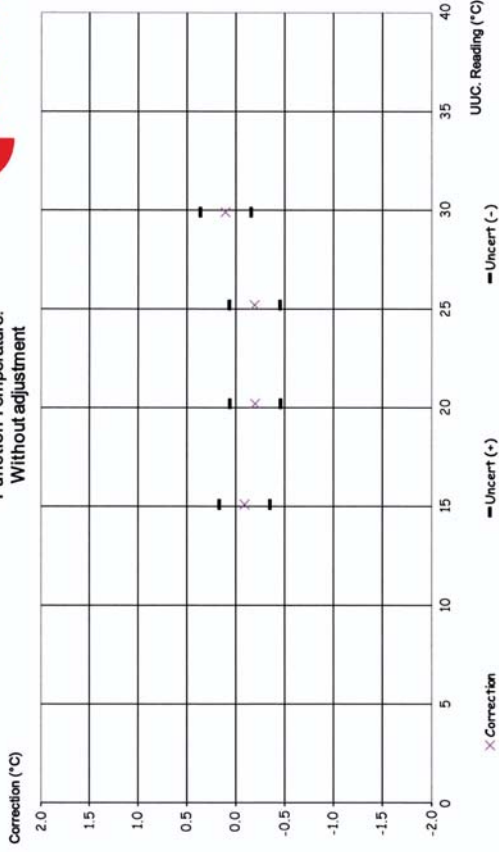
Check Date		รวมการตรวจเช็ค	Check before delivery		หมายเหตุ (Remark)
26 May 2026			26 May 2026		
Normal	Defective		Normal	Defective	
		General			
☐	☐	1. สายไฟ (Electric wire)	☐	☐	ไม่มี
☐	☐	2. การทำงาน (On/Off Switch)	☐	☐	ไม่มี
☒	☐	3. การทำงานปุ่มกดต่างๆ (Selector Key)	☒	☐	
☒	☐	4. การแสดงผลหน้าจอ (Display)	☒	☐	
☒	☐	5. แบตเตอรี่ (Battery)	☒	☐	
☒	☐	6. สภาพตัวเครื่อง (Equipment Body)	☒	☐	
☐	☐	7. หัววัดเซ็นเซอร์ (Sensor External)	☐	☐	ไม่มี
☒	☐	8. ฝาปิดแบตเตอรี่ (Battery cover)	☒	☐	

Note :

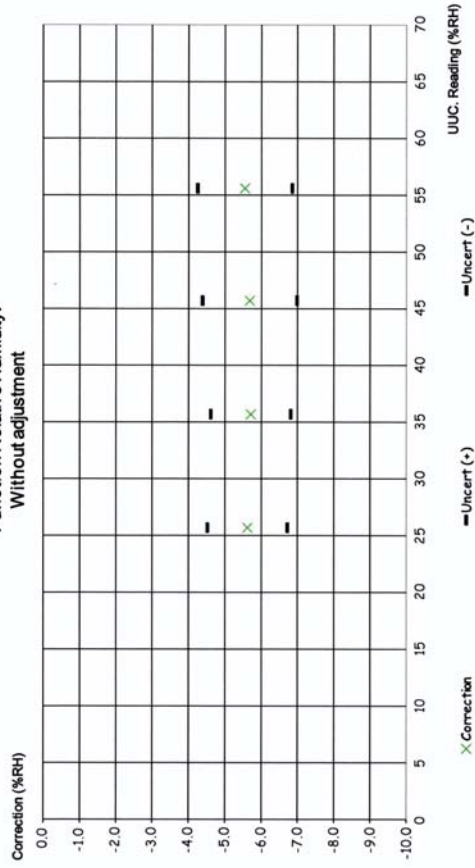
Mr. Tweewong Thaitiang
Service Engineer



C19262638
Function Temperature:
Without adjustment



C19262638
Function Relative Humidity:
Without adjustment



Certificate of Calibration

Certificate No. : 69-430003-1

Page : 1 of 2

Submitted by :

C.E.M Technology (Thailand) Co., Ltd.

219/43 Moo.12 Petchkasem Rd, Omnoi, Krathumban, Samutsakorn 74130 (Head Office)

Equipment :

Digital Conductivity meter with probe

Manufacturer : Apera

Model : PC 910

Serial No. : PC910X1220811001 ID No. : WW-03-002

Electrode

Model : N/A

Serial No. : N/A

ID No. : WW-03-002

Environment :

On site calibration was carried out at the Laboratory,

C.E.M Technology (Thailand) Co., Ltd.

Ambient Temperature (26.0 to 27.0) °C

Relative Humidity (55 to 60) %

Date of Received :

17 February 2026

Date of Calibration :

17 February 2026

Date of Issue :

24 February 2026

Calibrated by :

Permpon Chianpu

Calibration Method : In-house method CAL-M4301 direct measurement by conductivity buffer solution

Reference Standard Instruments : This certification is traceable to the International System of Units

Standard Buffer Solution

Material Lot No.

Exp. Date Traceability

84 µS/cm 0300 01 June 2027 National Institute of Standards and Technology (NIST), U.S.A., S.R.M

1413.1 µS/cm 1081106 28 February 2026 CPA Chem Ltd. Accredited to ISO 17034 and ISO/IEC 17025

12.881 mS/cm 1081107 11 March 2026 CPA Chem Ltd. Accredited to ISO 17034 and ISO/IEC 17025

The Uncertainties are for a confidence probability of approximately 95%

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Certificate of Calibration

Certificate No. : 69-430003-1

Page : 2 of 2

Result of Calibration :

UUC Condition As-Received : Good

Function : Conductivity measurement

Before Adjustment

Standard Conductivity Solution	UUC Reading	Correction	Uncertainty (±)	Unit
84*	84.2	-0.2	1.1	µS/cm
1413	1416	-3	9.0	µS/cm
12.88	13.02	-0.14	0.082	mS/cm

After Adjustment : at 84, 1413 µS/cm 12.880 mS/cm

Standard Conductivity Solution	UUC Reading	Correction	Uncertainty (±)	Unit
84*	84.0	0.0	1.1	µS/cm
1413	1413	0	9.0	µS/cm
12.88	12.88	0.00	0.082	mS/cm

Remark

UUC : Unit Under Calibration

* This parameter are out of accreditation's scope.

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

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

-o0o-



Certificate of Calibration

Certificate No. : 69-420017-1

Page : 1 of 2

Submitted by : C.E.M Technology (Thailand) Co., Ltd.

219/43 Moo.12 Petchkasem Rd, Omnoi, Krathumban, Samutsakorn 74130 (Head Office)

Equipment :

pH Meter with electrode

pH meter

Manufacturer : Apera Model : PC 910

Range : N/A pH Resolution : 0.01 pH

Serial No. : PC910X1220811001 ID No. : WW-03-002

Electrode

Model : N/A Serial No. : VV1-15843

ID No. : WW-03-002

Environment : On site calibration was carried out at the Laboratory,

C.E.M Technology (Thailand) Co., Ltd.

Ambient Temperature : (26.0 to 27.0)°C

Relative Humidity : (50 to 55) %

Date of Received : 17 February 2026

Date of Calibration : 17 February 2026

Date of Issue : 24 February 2026

Calibrated by : Permpon Chanpu

Calibration Method : In-house method CAL-M4201 direct measurement by using standard voltage calibrator

and using certified reference material (CRM)

Reference Standard Instruments : This certification is traceable to the International System of Units

1. Multiproduct Calibrator

ID No.	Cert. No.	Due Date	Traceability
400005	SG-E-00231/68	20 Aug 2027	National Institute of Metrology Thailand (NIMT)

2. Standard Buffer Solution

pH	Cert. No.	Lot No.	Exp. Date	Traceability
4.008	61340084	1146794	30 Oct 2027	CPA Chem Ltd. Accredited to ISO 17034 and ISO/IEC 17025
6.988	61328150	1146796	25 Oct 2026	CPA Chem Ltd. Accredited to ISO 17034 and ISO/IEC 17025
10.010	61323674	1146795	30 Oct 2026	CPA Chem Ltd. Accredited to ISO 17034 and ISO/IEC 17025

The Uncertainties are for a confidence probability of approximately 95%

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Certificate of Calibration

Certificate No. : 69-420017-1

Page : 2 of 2

Result of Calibration :

UUC Condition As-Received : Good

Function : Electrical measurement

pH meter

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

Adjustment Curve at nominal pH	Applied Voltage (mV)	Nominal Value (pH)	UUC Reading (pH) (mV)	Correction (mV)	Uncertainty (± mV)
4, 7, 10	177.4800	4	4.00 177	0	0.59
	0.0000	7	7.00 0	0	0.58
	-177.4800	10	10.00 -178	1	0.59

Function : pH meter with electrode

Performing a three - buffer standard curve using buffer nominal pH (4,7,10)

Adjustment Curve at nominal pH	Standard Buffer (pH)	UUC Reading (pH)	Correction (pH)	Uncertainty (± pH)
4, 7, 10	4.008	4.00	0.01	0.0097
	6.988	7.00	-0.01	0.011
	10.010	10.01	0.00	0.014

Remark

UUC : Unit Under Calibration

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

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

-o0o-



Certificate of Calibration

Certificate No. : 69-400074-1

Page : 1 of 2

Submitted by :

C.E.M Technology (Thailand) Co.,Ltd.

219/43 Moo.12 Petchkasem Rd, Omnoi, Krathumban, Samutsakorn 74130 (Head Office)

Equipment :

Temperature Indicator with Thermistor Probe

Temperature Indicator

Manufacturer : Apera

Model : PC 910

Range : N/A °C

Resolution : 0.1 °C

Serial No. : PC910X1220811001

ID No. : WW-03-002

Thermistor probe

Model : N/A

Sheath Material : Stainless

Diameter : 4.8 mm.

Length : 95 mm.

Serial No. : N/A

ID No. : WW-03-002

Environment :

On site calibration was carried out at the Laboratory,

C.E.M Technology (Thailand) Co., Ltd.

Ambient Temperature : (26.0 to 27.0) °C

Relative Humidity : (55 to 60) %

Line Voltage : (224.5 to 226.0) VAC

Date of Received :

17 February 2026

Date of Calibration :

17 February 2026

Date of Issue :

24 February 2026

Calibrated by :

Permpoon Chanpu

Calibration Method : This instrument was calibrated by In-house method comparison technique CAL-M4003

by compared with PRT in the liquid bath at the constant controlled temperature.

The temperature scale used was based on ITS-90

Reference Standard Instruments : This certification is traceable to the International System of Units

1. Platinum Resistance Thermometer (PRT)

ID No. Cert. No. Due Date

Traceability

400016 TT-1019-25 13 May 2027

National Institute of Metrology Thailand (NIMT)

2. Standard Digital Thermometer

ID No. Cert. No. Due Date

Traceability

400033 24E633 21 Feb 2026

National Institute of Metrology

The Uncertainties are for a confidence probability of approximately 95%

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Certificate of Calibration

Certificate No. : 69-400074-1

Page : 2 of 2

Result of Calibration :

Without Adjustment

UUC Condition As-Received : Good

Function :

Temperature measurement

Immersion Depth (mm.)	Standard Reading (°C)	UUC Reading (°C)	Correction (°C)	Uncertainty (± °C)
95	25.004	25.1	-0.1	0.19

Remark

UUC : Unit Under Calibration

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

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

-o0o-





Certificate of Calibration

Equipment: Hot Air Oven
Manufacturer: Memmert
Model: UF 55
Serial No.: B219.0142
ID No.: WW-05-002
Shelves(pc.): 2
Condition of the item: Normal

Customer: C.E.M Technology (Thailand) Co., Ltd.
219/43 Moo 12 Petchkasem Road,
Ornoi Krathum Baen, Samut Sakhon 74130 Thailand

Environment Condition:
Temperature: 30 °C ± 1.1 °C
Relative Humidity: 53 % ± 4.6 %
Voltage: 227 VAC ± 1.8 VAC

Calibration Place: C.E.M Technology (Thailand) Co., Ltd. (Laboratory Room)
219/43 Moo 12 Petchkasem Road,
Ornoi Krathum Baen, Samut Sakhon 74130 Thailand

Calibration By: Mr. Sittiphong Lekfu
Calibration Date: 09 February 2026
The Method Used: In house method, CAL-WI-16, base on TLAS-G20
Traceability: This certificate is traceable to the SI Units maintained by National Institute of Metrology (NIMT), Thailand through DKSH Technology Limited.

Certificate No. C10250013



DKSH Technology Limited
2533 Sukhumvit Road, Bangkok 10260
Phone: +66 2539 7000 Email: info.calibration@dksh.com Website: www.dksh.com/scientific-thailand

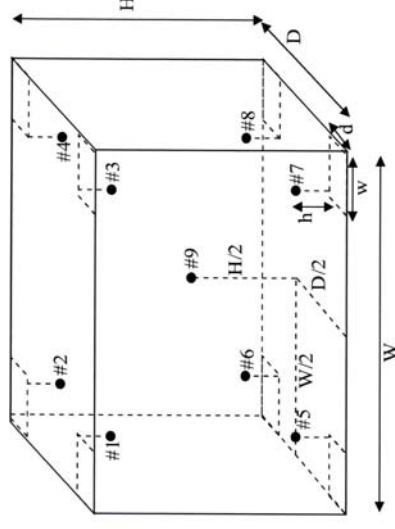
Delivering Growth - in Asia and Beyond.

CAL-FM-C31-11: 30 Jun 2025



Certificate No.: C31260296

Page: 2 of 4



Standard Installation Locations

Volume (Calibration Zone) = 21 (Liters)

Inside chamber:

W = 40 (cm) D = 33 (cm) H = 40 (cm)

Standard Locations (#1, #2, #3, #4): w = 5 (cm) d = 5 (cm) h = 5 (cm)

Standard Locations (#5, #6, #7, #8): w = 5 (cm) d = 5 (cm) h = 5 (cm)

#9: Geometric center of the chamber

Position of Std	#1	#2	#3	#4	#5	#6	#7	#8	#9
Channel of Logger	301	302	303	304	305	306	307	308	309

Definitions

Indicating Temperature: The average reading of indicating device which forms the integral part of the enclosure.

Measured Temperature: The average reading of standards at any positions or location.

Measured Uniformity: The maximum difference of measured temperatures between of any probes and the measured temperature at the reference location which are observed at same time or at close observation time as possible to determine the temperature pattern or homogeneity with the chamber at steady-state. The reference probe is preferably located in the geometric center of the chamber.

Measured Stability: The one-half of greatest maximum difference of measured temperatures at any one probe.

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

DKSH Technology Limited
2533 Sukhumvit Road, Bangkok 10260
Phone: +66 2539 7000 Email: info.calibration@dksh.com Website: www.dksh.com/scientific-thailand

Delivering Growth - in Asia and Beyond.

CAL-FM-C31-11: 30 Jun 2025



Calibration Results:
Before adjustment

Setting: 180.0 Indicating: #1: 180.0 #2: 179.68 #3: 179.97 #4: 180.88 #5: 180.46 #6: 180.07 #7: 180.16 #8: 180.55 #9: 180.64

After adjustment

Measurement Temperature at Spread Locations, Indicating of Unit Under Calibration: 104.0 °C

Locations	Measured Temperature (°C)	Correction of UUC (°C)	Uncertainty (± °C)
#1	103.89	-0.11	0.38
#2	103.90	-0.10	0.38
#3	104.20	0.20	0.38
#4	104.07	0.07	0.38
#5	104.13	0.13	0.38
#6	103.89	-0.11	0.38
#7	103.90	-0.10	0.38
#8	104.06	0.06	0.38
#9	104.17	0.17	0.38

Temperature Distribution

Desired (°C)	Setting (°C)	Indicating (°C)	Measured Temperature at Spread Locations (°C)									Uncertainty (± °C)*
			#1	#2	#3	#4	#5	#6	#7	#8	#9	
104.0	104.0	104.0	103.89	103.90	104.20	104.07	104.13	103.89	103.90	104.06	104.17	0.38

Chamber Characterization

Indicating (°C)	Measured Uniformity (°C)	Measured Stability (± °C)	Overall Variation (°C)
104.0	0.36	0.07	0.42

Note: * Maximum uncertainty of the each position



Without adjustment (Cont.)

Measurement Temperature at Spread Locations, Indicating of Unit Under Calibration: 180.0 °C

Locations	Measured Temperature (°C)	Correction of UUC (°C)	Uncertainty (± °C)
#1	179.47	-0.53	0.42
#2	179.77	-0.23	0.42
#3	180.72	0.72	0.42
#4	180.19	0.19	0.42
#5	180.42	0.42	0.42
#6	179.87	-0.13	0.42
#7	179.94	-0.06	0.42
#8	180.42	0.42	0.42
#9	180.42	0.42	0.42

Temperature Distribution

Desired (°C)	Setting (°C)	Indicating (°C)	Measured Temperature at Spread Locations (°C)									Uncertainty (± °C)*
			#1	#2	#3	#4	#5	#6	#7	#8	#9	
180.0	180.0	180.0	179.47	179.77	180.72	180.19	180.42	179.87	179.94	180.42	180.42	0.42

Chamber Characterization

Indicating (°C)	Measured Uniformity (°C)	Measured Stability (± °C)	Overall Variation (°C)
180.0	1.03	0.07	1.38

Note: * Maximum uncertainty of the each position

The End of Certificate



Statements of conformity:

This conformity certificate documents the validity of the following statements of conformity based on the measurement results of corresponding calibration certificate:

The correction of indication determined during calibration are under given measurement and environmental conditions and considering the expanded measurement uncertainty (coverage probability 95%) within the specification. The given measurement uncertainty already includes other all effects by according to the standard method, TLAS-G20. Therefore, those parameters have not been assessed separately.

Tolerance and Decision rules:

Assessment of the conformity of the measurement device are done based on direct comparison of the relevant measurement results with the tolerances and decision rule are prescribed by the customer.

Decision rule : ☐ Choice A Binary Statement for Simple Acceptance Rule ($w = 0$), Specific Risk < 50% PFA.

☒ Choice B Non-binary statement with guard band ($w = 1$ U), Pass or Fail Specific Risk < 2.5% PFA and Condition Pass or Condition Fail Specific Risk < 50% PFA.

☐ Choice C Customer defined, Customers may define arbitrary multiple of r to have applied as guard band ($w = r$ U).

; PFA – Probability of False

After adjustment

Desired Temperature : 104.0°C Tolerances : 1.0 °C

Measurement Temperature at Spread Locations, Indicating of Unit Under Calibration: 104.0 °C

Locations	Measured (°C)	Correction* (°C)	Guard band (w) (± °C)	Tolerance (± °C)	Conformity
#1	103.89	-0.11	0.38	1.0	Pass
#2	103.90	-0.10	0.38	1.0	Pass
#3	104.20	0.20	0.38	1.0	Pass
#4	104.07	0.07	0.38	1.0	Pass
#5	104.13	0.13	0.38	1.0	Pass
#6	103.89	-0.11	0.38	1.0	Pass
#7	103.90	-0.10	0.38	1.0	Pass
#8	104.06	0.06	0.38	1.0	Pass
#9	104.17	0.17	0.38	1.0	Pass

Correction* = Measured Temperature - Desired Temperature

The validity of the statements of conformity cannot be guaranteed for different places of use, environmental conditions or improper use.



Statements of conformity:(Cont.)

Without adjustment (Cont.)

Desired Temperature : 180.0°C Tolerances : 2.0 °C

Measurement Temperature at Spread Locations, Indicating of Unit Under Calibration: 180.0 °C

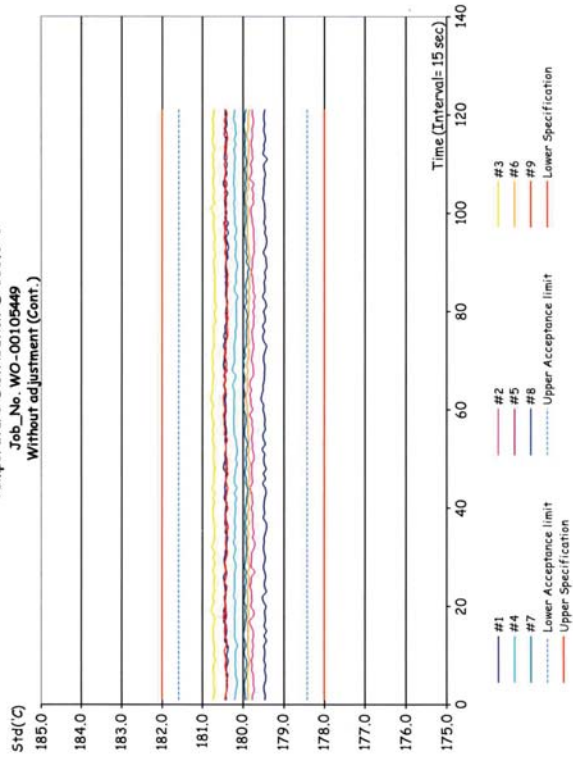
Locations	Measured (°C)	Correction* (°C)	Guard band (w) (± °C)	Tolerance (± °C)	Conformity
#1	179.47	-0.53	0.42	2.0	Pass
#2	179.77	-0.23	0.42	2.0	Pass
#3	180.72	0.72	0.42	2.0	Pass
#4	180.19	0.19	0.42	2.0	Pass
#5	180.42	0.42	0.42	2.0	Pass
#6	179.87	-0.13	0.42	2.0	Pass
#7	179.94	-0.06	0.42	2.0	Pass
#8	180.42	0.42	0.42	2.0	Pass
#9	180.42	0.42	0.42	2.0	Pass

Correction* = Measured Temperature - Desired Temperature

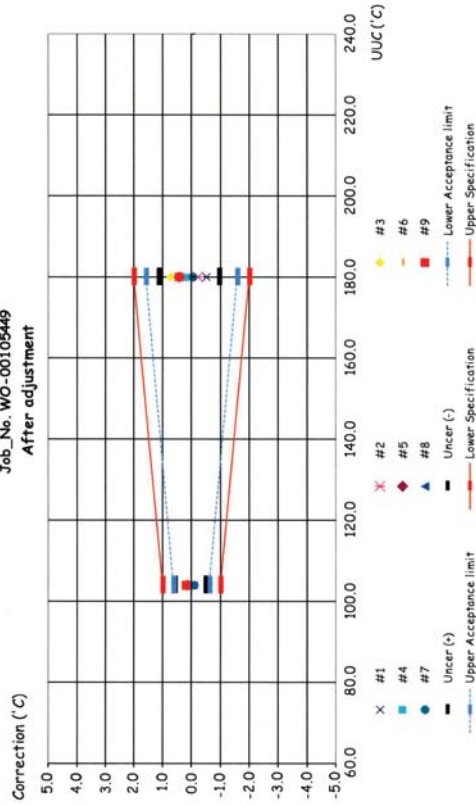
The validity of the statements of conformity cannot be guaranteed for different places of use, environmental conditions or improper use.

The End of Statements of Conformity

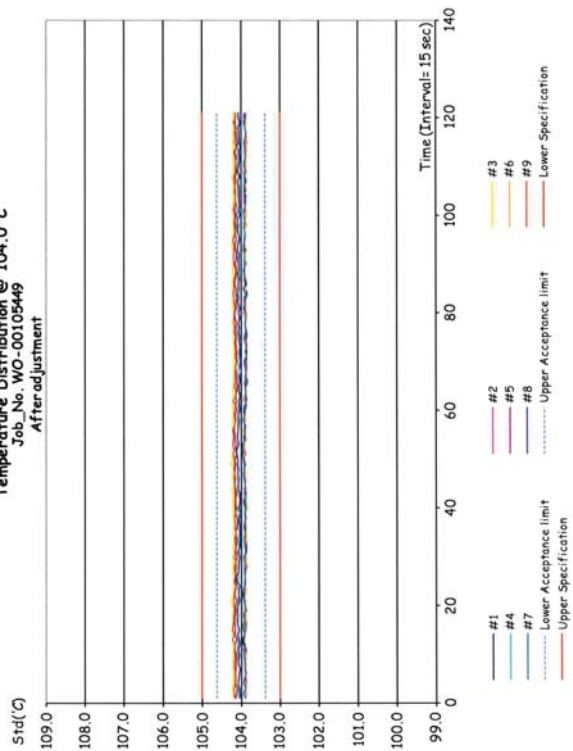
Temperature Distribution @ 180.0°C
Job No. WO-00105449
Without adjustment (Cont.)



Corr_Distribution & Max_Measurement Uncertainty
Job No. WO-00105449
After adjustment



Temperature Distribution @ 104.0°C
Job No. WO-00105449
After adjustment





ใบตรวจสอบสภาพเครื่องควบคุมอุณหภูมิ

เลขที่ใบงาน: WO-00105449

ชนิดเครื่องมือ: Hot Air Oven
หมายเลขเครื่อง: B219.0142

รุ่น: UF 55

ตรวจสอบ (รับ)	รายการตรวจสอบ				ตรวจสอบ (ส่ง)	หมายเหตุ
	09 Feb 2026					
	ปกติ	ไม่ปกติ				
		<i>General</i>				
☒	☐	1. สายไฟ	☒	☐		
☒	☐	2. การทำงาน Main Switch	☒	☐		
☒	☐	3. การทำงาน Selector Key	☒	☐		
☒	☐	4. การแสดงผล Display	☒	☐		
☒	☐	5. การทำงาน ฟัดลม	☒	☐		
☒	☐	6. สวิทช์ Lever of Ventilation valve	☒	☐		
☒	☐	7. สวิทช์ Lever door open / close	☒	☐		
☒	☐	8. สวิทช์ Door seal	☒	☐		
☒	☐	9. การทำงานของระบบ Safety	☒	☐		
☐	☐	10. การทำงานของระบบทำความเย็น	☐	☐		ไม่มี
☐	☐	11. การทำงานของระบบทำความร้อน	☐	☐		ไม่มี
☒	☐	12. สภาพตัวเครื่อง	☒	☐		
☒	☐	13. สภาวะแวดล้อม ณ สถานที่ตั้งเครื่อง	☒	☐		

ข้อแนะนำ:



บริษัท ดีเคเอส อีเซีย จำกัด
DKSH Technology Limited
2533 สุขุมวิท ถนนสุขุมวิท กรุงเทพมหานคร 10260
Phone: +66 2639 7000 Email: info.calibration@dksh.com Website: www.dksh.com/scientific-thailand

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Certificate of Calibration

Equipment: Cooled Incubator
Manufacturer: Binder
Model: KB 240
Serial No.: 20180000012164
ID No.: WW-16-001
Shelves(pc.): 3
Condition of the item: Normal

Certificate No.: C31260297
Issued Date: 11 February 2026
Job No.: WO-00105449
Ventilation Valve: None
Page: 1 of 3

Customer: C.E.M Technology (Thailand) Co., Ltd.
219/43 Moo 12 Petchkasem Road,
Omnoi Krathum Baen, Samut Sakhon 74130 Thailand

Environment Condition:
Temperature: 24 °C ± 0.6 °C
Relative Humidity: 49 % ± 5.4 %
Voltage: 227 VAC ± 1.7 VAC

Calibration Place: C.E.M Technology (Thailand) Co., Ltd. (Laboratory Room)
219/43 Moo 12 Petchkasem Road,
Omnoi Krathum Baen, Samut Sakhon 74130 Thailand

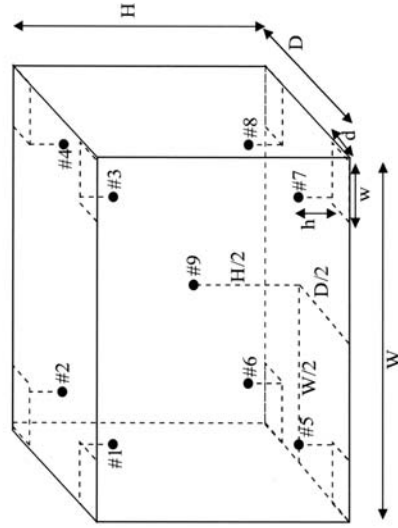
Calibration By: Mr. Sittiphong Lekfu
Calibration Date: 09 February 2026
The Method Used: In house method, CAL-WI-16, base on TLAS-G20
Traceability: This certificate is traceable to the SI Units maintained by National Institute of Metrology (NIMT), Thailand through DKSH Technology Limited.



(K=2) to provide a level of confidence of approximately 95%. It is determined in accordance with Evaluation of measurement data - Guide to the expression of uncertainty in measurement (JCGM 100).
These results may be affected by deviations from specified conditions. The results relate only to the items tested, calibrated or sampled. The report shall not be reproduced except in full without approval of DKSH Technology Limited.

บริษัท ดีเคเอส อีเซีย จำกัด
DKSH Technology Limited
2533 สุขุมวิท ถนนสุขุมวิท กรุงเทพมหานคร 10260
Phone: +66 2639 7000 Email: info.calibration@dksh.com Website: www.dksh.com/scientific-thailand

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Standard Installation Locations

Volume (Calibration Zone)= 122 (Liters)

Inside chamber:

W = 65 (cm) D = 50 (cm) H = 76 (cm)

Standard Locations (#1, #2, #3, #4): w = 7 (cm) d = 5 (cm) h = 8 (cm)

Standard Locations (#5, #6, #7, #8): w = 7 (cm) d = 5 (cm) h = 8 (cm)

#9: Geometric center of the chamber

Position of Std	#1	#2	#3	#4	#5	#6	#7	#8	#9
Channel of Logger	101	102	103	104	105	106	107	108	109

Definitions

Indicating Temperature: The average reading of indicating device which forms the integral part of the enclosure.

Measured Temperature: The average reading of standards at any positions or location.

Measured Uniformity: The maximum difference of measured temperatures between of any probes and the measured temperature at the reference location which are observed at same time or at close observation time as possible to determine the temperature pattern or homogeneity with the chamber at steady-state. The reference probe is preferably located in the geometric center of the chamber.

Measured Stability: The one-half of greatest maximum difference of measured temperatures at any one probe.

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

Calibration Results: Without adjustment

Measurement Temperature at Spread Locations, Indicating of Unit Under Calibration: 20.0 °C

Locations	Measured Temperature (°C)	Correction of UUC. (°C)	Uncertainty (± °C)
#1	20.06	0.06	0.64
#2	19.96	-0.04	0.82
#3	19.87	-0.13	0.78
#4	20.03	0.03	0.66
#5	20.18	0.18	0.62
#6	19.89	-0.11	0.69
#7	19.97	-0.03	0.62
#8	20.03	0.03	0.56
#9	20.21	0.21	0.60

Temperature Distribution

Desired (°C)	Setting (°C)	Indicating (°C)	Measured Temperature at Spread Locations (°C)									Uncertainty (± °C)*
			#1	#2	#3	#4	#5	#6	#7	#8	#9	
20.0	20.0	20.0	20.06	19.96	19.87	20.03	20.18	19.89	19.97	20.03	20.21	0.82

Chamber Characterization

Indicating (°C)	Measured Uniformity (°C)	Measured Stability (± °C)	Overall Variation (°C)
20.0	0.62	0.68	1.51

Note: * Maximum uncertainty of the each position

The End of Certificate



Statements of conformity:

This conformity certificate documents the validity of the following statements of conformity based on the measurement results of corresponding calibration certificate:

The correction of indication determined during calibration are under given measurement and environmental conditions and considering the expanded measurement uncertainty (coverage probability 95%) within the specification. The given measurement uncertainty already includes other all effects by according to the standard method, TLAS-G20. Therefore, those parameters have not been assessed separately.

Tolerance and Decision rules:

Assessment of the conformity of the measurement device are done based on direct comparison of the relevant measurement results with the tolerances and decision rule are prescribed by the customer.

Decision rule : ☐ Choice A Binary Statement for Simple Acceptance Rule ($w = 0$), Specific Risk < 50% PFA.

☒ Choice B Non-binary statement with guard band ($w = 1$ U), Pass or Fail Specific Risk < 2.5% PFA and Condition Pass or Condition Fail Specific Risk < 50% PFA.

☐ Choice C Customer defined, Customers may define arbitrary multiple of r to have applied as guard band ($w = r$ U).

; PFA – Probability of False Accept



Without adjustment

Desired Temperature : 20.0 °C Tolerances : 1.0 °C

Measurement Temperature at Spread Locations, Indicating of Unit Under Calibration: 20.0 °C

Locations	Measured (°C)	Correction* (°C)	Guard band (w) (± °C)	Tolerance (± °C)	Conformity
#1	20.06	0.06	0.64	1.0	Pass
#2	19.96	-0.04	0.82	1.0	Pass
#3	19.87	-0.13	0.78	1.0	Pass
#4	20.03	0.03	0.66	1.0	Pass
#5	20.18	0.18	0.62	1.0	Pass
#6	19.89	-0.11	0.69	1.0	Pass
#7	19.97	-0.03	0.62	1.0	Pass
#8	20.03	0.03	0.56	1.0	Pass
#9	20.21	0.21	0.6	1.0	Pass

Correction* = Measured Temperature - Desired Temperature

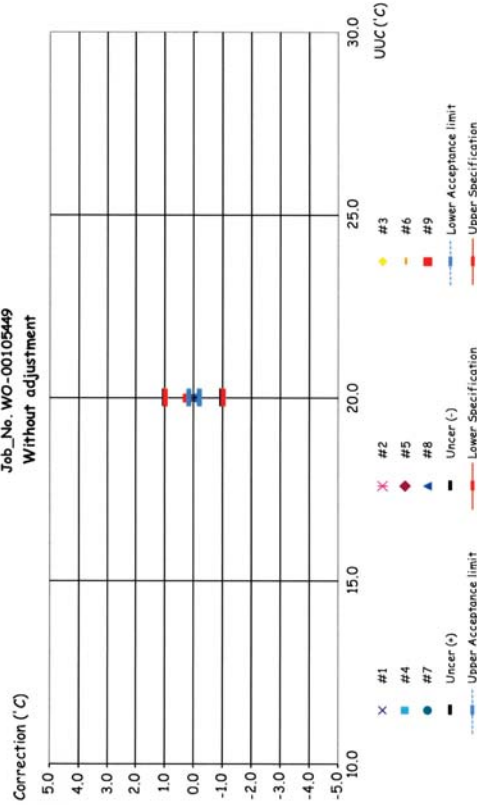
The validity of the statements of conformity cannot be guaranteed for different places of use, environmental conditions or improper use.

The End of Statements of Conformity

Corr_Distribution & Max_Measurement Uncertainty

Job_No. WO-00105449

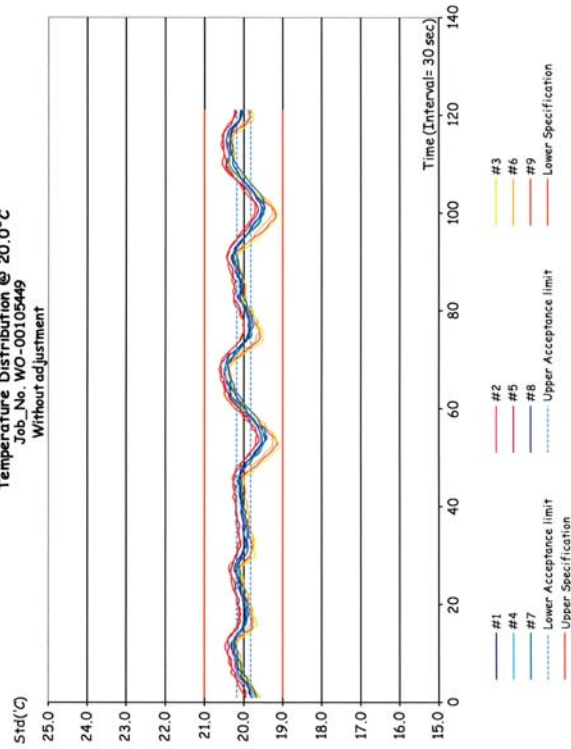
Without adjustment



Temperature Distribution @ 20.0 °C

Job_No. WO-00105449

Without adjustment



ใบตรวจสอบสภาพเครื่องควบคุมอุณหภูมิ

เลขที่ใบงาน: WO-00105449

ชนิดเครื่องมือ: Cooled Incubator
หมายเลขเครื่อง: 20180000012164

รุ่น: KB 240

ตรวจสอบ (รับ)	09 Feb 2026	ผลการตรวจสอบ		หมายเหตุ
		ปกติ	ไม่ปกติ	
ปกติ	ไม่ปกติ			
General				
☒	☐	1. สายไฟ	☒	
☒	☐	2. การทำงาน Main Switch	☒	
☒	☐	3. การทำงาน Selector Key	☒	
☒	☐	4. การแสดงผล Display	☒	
☒	☐	5. การทำงาน ฟัดลม	☒	
☐	☐	6. สภาวะ Lever of Ventilation valve	☐	ไม่มี
☒	☐	7. สภาวะ Lever door open / close	☒	
☒	☐	8. สภาวะ Door seal	☒	
☒	☐	9. การทำงานของระบบ Safety	☒	
☒	☐	10. การทำงานของระบบทำความเย็น	☒	
☐	☐	11. การทำงานของระบบทำความร้อน	☐	ไม่มี
☒	☐	12. สภาวะตัวเครื่อง	☒	
☒	☐	13. สภาวะแวดล้อม ณ สถานที่ตั้งเครื่อง	☒	

ข้อแนะนำ :



Certificate of Calibration

Certificate No.: WK2606-412-976

Page 1 of 2

Customer : C.E.M Technology (Thailand) Co., Ltd
219/43 Moo 12 Phet Kasem Rd., Om Noi,
Krathum Baen District, Samut Sakhon 74130

Instrument : Portable Turbidity Meter
Manufacturer : BANTE
Model : TB100
Serial No. : 210128-023
Identity No. : N/A
Range : 0 NTU to 1100 NTU
Resolution : 0.01 NTU, 0.1 NTU, 1 NTU
Calibration Method : CP-WK-C07

Ambient Temperature : (25 ± 2) °C
Humidity : (50 ± 15) %RH
Received Date : 09-Jun-26
Calibrated Date : 11-Jun-26
Issued Date : 12-Jun-26
Calibrated Location : In Lab

Reference Standard Instrument :

Instrument	Serial No.	Certificate No.	Due Date	Traceability to
Turbidity Solution	TD10NTU.L5	1202697	17-Mar-27	CPAchem Ltd.
Turbidity Solution	TD20NTU.L5	1202698	17-Mar-27	CPAchem Ltd.
Turbidity Solution	TD100NTU.L5	1202699	17-Mar-27	CPAchem Ltd.
Turbidity Solution	TD500NTU.L5	1202700	17-Mar-27	CPAchem Ltd.
Turbidity Solution	TD800NTU.L5	1202701	17-Mar-27	CPAchem Ltd.
Turbidity Solution	TD1000NTU.L5	1202702	17-Mar-27	CPAchem Ltd.
Platinum Resistance Thermometer	4507	PSL-T 0494/69	06-Mar-27	TISTR

TISTR : Thailand Institute of Scientific and Technological Research.
This result calibrate was found accurate as shown on date and place of calibrate only
This certificate is traceability to the International System of Unit (SI)

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 %

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Calibration Results

Certificate No. : WK2606-412-976

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Calibration Result of the Accuracy

Function : Turbidity Measurement at 25 °C
Resolution : 0.01 NTU, 0.1 NTU, 1 NTU

Standard Solution	UUC Reading	Error	Unit : NTU	
			Uncertainty (±)	
10.00	10.03	0.03	0.051	
20.00	20.03	0.03	0.10	
100.0	100.2	0.2	0.80	
500.0	500.2	0.2	3.0	
800.0	800.1	0.1	4.0	
1000	1000	0	7.0	

(X) Without Adjustment () After Adjustment

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**** End of Certificate ****



Certificate of Calibration

Aquion RFIC: Anion (ID#1084)

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

Aquion S/N: 221280114
AS-DV S/N: 2205880126

For



Qualification Report

PM Check list, CM_OQ and PQ

Aquion RFIC: Anion (ID#1084)

(2nd (PM,PQ) / Contact) For

For C.E.M Technology (Thailand) Co., Ltd.

PM

Preventive Maintenance Check List



Dionex Ion Chromatography Preventive Maintenance Report

Customer Organization	Name/ Department
C.E.M Technology (Thailand) Co., Ltd	
Engineer	Date
Mr. Teerapat Boonla	19-20/Feb/26

Instrument Detail

Instrument Model	Application
Aquion RFI: Anion (ID#1084)	Anion
Instrument components	Serial Number
Aquion	221280114
AS-DV	2205880126

Consumable Detail

Columns	Guard Columns	Suppressors	Concentrators	Etc.
AS18	AG18	ADRS 600		EGC III
Remark:				

Customer

Date



General ICS Maintenance Checklist

No.	Description	Checked	Cleaned	Replaced	Result
Power on & Connection					
1	Instrument power on	☒	-	-	☐
2	Instrument connection	☒	-	-	☐
Injection Valve Rebuild					
3	Rebuilt injection valve 6 port	☒	Cleaned	Replaced	N.A.
4	- Rotor seal	☒	☐	☐	☐
5	- Stator face	☒	☐	☐	☐
(Optional) Auxiliary Valve Rebuild					
6	Rebuilt auxiliary valve 0 port	☒	Cleaned	Replaced	N.A.
7	- Rotor seal	☒	☐	☐	☐
8	- Stator face	☒	☐	☐	☐
Check Valve Cartridge					
9	Inlet check valve assembly	☒	Cleaned	Replaced	N.A.
10	Outlet check valve assembly	☒	☐	☐	☐
11	Verified correct flow orientation	☒	-	-	☐
Pump Piston Rinse Seal, Piston Seal and Piston					
12	Piston rinse seal in primary pump head	☒	Cleaned	Replaced	N.A.
13	Piston seal in primary pump head	☒	☐	☐	☐
14	Piston in primary pump head	☒	☐	☐	☐
15	Piston rinse seal in secondary pump head	☒	☐	☐	☐
16	Piston seal in secondary pump head	☒	☐	☐	☐
17	Piston in secondary pump head	☒	☐	☐	☐
Waste Valve and Priming Valve					
18	Waste valve	☒	Cleaned	Replaced	N.A.
19	Priming valve	☒	☐	☐	☐
Cell Detector					
20	Check conductivity cell	☒	Cleaned	Replaced	N.A.
21	Check electrochemical cell	☐	☐	☐	☒
22	- Working electrode	☐	☐	☐	☒
23	- Reference electrode	☐	☐	☐	☒
24	- Gasket	☐	☐	☐	☒
25	- Cell body	☐	☐	☐	☒
Other					
26	Sample Loop	☐	Cleaned	Replaced	N.A.
27	End-line filter	☒	☐	☐	☐
28	Leak sensor	☒	☐	☐	☐
29	Lubricate pump mechanic	☐	Lubricated	-	☐
30	Reconnected liquid lines to the valve	☒	-	-	☐
31	Reconnected liquid lines to pump heads	☒	-	-	☐
32	Primed pump	☒	-	-	☐
33	Checked pump for leaks	☒	-	-	☐
34	Checked gas for leaks	☒	-	-	☐

CM OQ

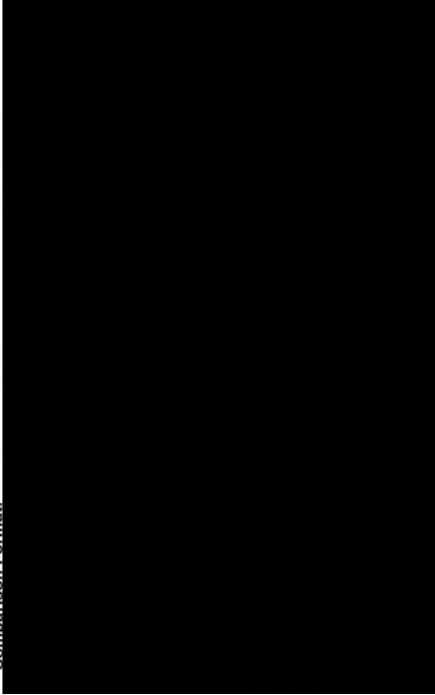
Chromeleon Operation Qualification

ThermoFisher SCIENTIFIC Chromeleon Operational Qualification

General Information

Instrument Controller:	Computer Name	Version Number:
Client:	DESKTOP-32T6H3B	7.3.1 Build 6535
Operator:	DESKTOP-32T6H3B	7.3.1.6535
	IC-User	
Overall Test Result:		Passed

Comparison Format:



ThermoFisher
S C I E N T I F I C

Chromeleon Operational Qualification, Part 1
Verification of Selected Results

Report Variable	Peak Name	Status
Detection Algorithm: Calibration Type: Evaluation Type: Standard Method: Calibration Mode:	Cobra	
	Lin. With Offset	
	Area	
Offset (c0)	External	
	Total	
Slope (c1)	Acetanilide	ok
	Acetophenone	ok
	Propiophenone	ok
Correlation Coeff.	Acetanilide	ok
	Acetophenone	ok
	Propiophenone	ok
Variance	Acetanilide	ok
	Acetophenone	ok
	Propiophenone	ok
Std. Deviation	Acetanilide	ok
	Acetophenone	ok
	Propiophenone	ok
Rel. Std. Dev.	Acetanilide	ok
	Acetophenone	ok
	Propiophenone	ok
Variance Coeff.	Acetanilide	ok
	Acetophenone	ok
	Propiophenone	ok

ThermoFisher
S C I E N T I F I C

Chromeleon Operational Qualification, Part 1
Verification of Selected Results

Report Variable	Peak Name	Status
Calibration Point X	Acetanilide	ok
	Acetophenone	ok
	Propiophenone	ok
Calibration Point Y	Acetanilide	ok
	Acetophenone	ok
	Propiophenone	ok
Amount [ng]	Acetanilide	ok
	Acetophenone	ok
	Propiophenone	ok
Resolution (EP)	Acetanilide	ok
	Acetophenone	ok
Resolution (USP)	Acetanilide	ok
	Acetophenone	ok
Peak Asymmetry (EP/USP)	Acetanilide	ok
	Acetophenone	ok
	Propiophenone	ok
Peak Asymmetry (AIA)	Acetanilide	ok
	Acetophenone	ok
	Propiophenone	ok

ThermoFisher
S C I E N T I F I C

Chromeleon Operational Qualification, Part 1

Verification of Selected Results

Report Variable	Peak Name	Status
Theoretical Plates (EP)	Acetanilide	ok
	Acetophenone	ok
	Propiophenone	ok
Theoretical Plates (USP)	Acetanilide	ok
	Acetophenone	ok
	Propiophenone	ok
Theoretical Plates (JP)	Acetanilide	ok
	Acetophenone	ok
	Propiophenone	ok

Test Result: Passed

ThermoFisher
S C I E N T I F I C

Chromeleon Operational Qualification, Part 2

Most Frequently Used Parameters: Comparison with Expected Results

Detection Algorithm: Cobra
Calibration Type: Lin, WithOffset
Evaluation Type: Area
Standard Method: External
Calibration Mode: Total

Variable Category	Report Variable	Peak Name	Status
Injection	No.		ok
	Name		ok
	Type		ok
	Position		ok
	Status		ok
	Volume		ok
	Dilution Factor		ok
	Weight		ok
	IntStd		ok
	InstrumentMethod		ok
	ProcessingMethod		ok
	Channel		ok
	No. of Peaks		ok
Chromatogram	Chromatogram Start Time		ok
	Signal Min.		ok
	Signal Max.		ok
	Unit		ok
Peak Results	Noise		ok
	No.	Acetanilide	ok
	No.	Acetophenone	ok
	No.	Propiophenone	ok
	Peak Name	Acetanilide	ok
	Peak Name	Acetophenone	ok
	Peak Name	Propiophenone	ok
	Ret.Time	Acetanilide	ok
	Ret.Time	Acetophenone	ok
	Ret.Time	Propiophenone	ok

ThermoFisher S C I E N T I F I C

Chromeleon Operational Qualification, Part 2

Most Frequently Used Parameters: Comparison with Expected Results

Variable Category	Report Variable	Peak Name	Status
Peak Results	Abs.Ret.Dev.	Acetanilide	ok
	Ret.Dev.(abs)	Acetophenone	ok
	Ret.Dev.(abs)	Propiophenone	ok
	Rel.Ret.Dev.	Acetanilide	ok
	Ret.Dev.(rel)	Acetophenone	ok
	Ret.Dev.(rel)	Propiophenone	ok
	Area	Acetanilide	ok
	Area	Acetophenone	ok
	Area	Propiophenone	ok
	Rel.Area	Acetanilide	ok
	Rel.Area (Total)	Acetophenone	ok
	Rel.Area (Total)	Propiophenone	ok
	Height	Acetanilide	ok
	Height	Acetophenone	ok
	Height	Propiophenone	ok
	Rel.Height (Total)	Acetanilide	ok
	Rel.Height (Total)	Acetophenone	ok
	Rel.Height (Total)	Propiophenone	ok
	Amount	Acetanilide	ok
	Amount	Acetophenone	ok
	Amount	Propiophenone	ok
	Concentration	Acetanilide	ok
	Concentration	Acetophenone	ok
	Concentration	Propiophenone	ok
	Rel.Amount	Acetanilide	ok
	Rel.Amount	Acetophenone	ok
	Rel.Amount	Propiophenone	ok
	Peak Width (0%)	Acetanilide	ok
	Peak Width (0%)	Acetophenone	ok
	Peak Width (0%)	Propiophenone	ok
	Peak Width (5%)	Acetanilide	ok
	Peak Width (5%)	Acetophenone	ok
	Peak Width (5%)	Propiophenone	ok
	Peak Width (10%)	Acetanilide	ok
	Peak Width (10%)	Acetophenone	ok
	Peak Width (10%)	Propiophenone	ok

ThermoFisher S C I E N T I F I C

Chromeleon Operational Qualification, Part 2

Most Frequently Used Parameters: Comparison with Expected Results

Variable Category	Report Variable	Peak Name	Status
Peak Results	Peak Width (50%)	Acetanilide	ok
	Peak Width (50%)	Acetophenone	ok
	Peak Width (50%)	Propiophenone	ok
	Left Width (0%)	Acetanilide	ok
	Left Width (0%)	Acetophenone	ok
	Left Width (0%)	Propiophenone	ok
	Right Width (0%)	Acetanilide	ok
	Right Width (0%)	Acetophenone	ok
	Right Width (0%)	Propiophenone	ok
	Peak Start	Acetanilide	ok
	Peak Start	Acetophenone	ok
	Peak Start	Propiophenone	ok
	Peak Stop	Acetanilide	ok
	Peak Stop	Acetophenone	ok
	Peak Stop	Propiophenone	ok
	Peak Start Value	Acetanilide	ok
	Peak Start Value	Acetophenone	ok
	Peak Start Value	Propiophenone	ok
	Peak Stop Value	Acetanilide	ok
	Peak Stop Value	Acetophenone	ok
	Peak Stop Value	Propiophenone	ok
	BL-Value Peak Start	Acetanilide	ok
	BL-Value Peak Start	Acetophenone	ok
	BL-Value Peak Start	Propiophenone	ok
	BL-Value Peak Stop	Acetanilide	ok
	BL-Value Peak Stop	Acetophenone	ok
	BL-Value Peak Stop	Propiophenone	ok
	Type	Acetanilide	ok
	Type	Acetophenone	ok
	Type	Propiophenone	ok
	Resolution (EP)	Acetanilide	ok
	Resolution(EP)	Acetophenone	ok
	Resolution(USP)	Acetanilide	ok
	Resolution(USP)	Acetophenone	ok
	Asymmetry(EP)	Acetanilide	ok
	Asymmetry(EP)	Acetophenone	ok
	Asymmetry(EP)	Propiophenone	ok

ThermoFisher S C I E N T I F I C

Chromeleon Operational Qualification, Part 2

Most Frequently Used Parameters: Comparison with Expected Results

Variable Category	Report Variable	Peak Name	Status
Peak Results	Asymmetry(AIA)	Acetanilide	ok
	Asymmetry(AIA)	Acetophenone	ok
	Asymmetry(AIA)	Propiophenone	ok
	Theor. Plates(EP)	Acetanilide	ok
	Theor. Plates(EP)	Acetophenone	ok
	Theor. Plates(EP)	Propiophenone	ok
	Theor. Plates(USP)	Acetanilide	ok
	Theor. Plates(USP)	Acetophenone	ok
	Theor. Plates(USP)	Propiophenone	ok
	Theor. Plates(JP)	Acetanilide	ok
	Theor. Plates(JP)	Acetophenone	ok
	Theor. Plates(JP)	Propiophenone	ok
Peak Calibration	Cal.Mode	Acetanilide	ok
	Cal.Mode	Acetophenone	ok
	Cal.Mode	Propiophenone	ok
	Cal.Type	Acetanilide	ok
	Cal.Type	Acetophenone	ok
	Cal.Type	Propiophenone	ok
	Weights	Acetanilide	ok
	Weights	Acetophenone	ok
	Weights	Propiophenone	ok
	Calibr. Coefficient C0	Acetanilide	ok
	Calibr. Coefficient C0	Acetophenone	ok
	Calibr. Coefficient C0	Propiophenone	ok
	Calibr. Coefficient C1	Acetanilide	ok
	Calibr. Coefficient C1	Acetophenone	ok
	Calibr. Coefficient C1	Propiophenone	ok
	RF-Value	Acetanilide	ok
	RF-Value	Acetophenone	ok
	RF-Value	Propiophenone	ok
	No. of Points	Acetanilide	ok
	No. of Points	Acetophenone	ok
	No. of Points	Propiophenone	ok

ThermoFisher S C I E N T I F I C

Chromeleon Operational Qualification, Part 2

Most Frequently Used Parameters: Comparison with Expected Results

Variable Category	Report Variable	Peak Name	Status
Peak Calibration	No. of Points	Propiophenone	ok
	No. of Points(disabled)	Acetanilide	ok
	No. of Points(disabled)	Acetophenone	ok
	No. of Points(disabled)	Propiophenone	ok
	Variance	Acetanilide	ok
	Variance	Acetophenone	ok
	Variance	Propiophenone	ok
	Var.Coeff	Acetanilide	ok
	Var.Coeff	Acetophenone	ok
	Var.Coeff	Propiophenone	ok
	Std.Dev.	Acetanilide	ok
	Std.Dev.	Acetophenone	ok
	Std.Dev.	Propiophenone	ok
	Rel.Std.Dev.	Acetanilide	ok
	Rel.Std.Dev.	Acetophenone	ok
	Rel.Std.Dev.	Propiophenone	ok
	Corr.Coeff.	Acetanilide	ok
	Corr.Coeff.	Acetophenone	ok
	Corr.Coeff.	Propiophenone	ok
	R-Square	Acetanilide	ok
	R-Square	Acetophenone	ok
	R-Square	Propiophenone	ok
	Adj. R-Square	Acetanilide	ok
	Adj. R-Square	Acetophenone	ok
	Adj. R-Square	Propiophenone	ok
	X	Acetanilide	ok
	X	Acetophenone	ok
	X	Propiophenone	ok
	Y	Acetanilide	ok
	Y	Acetophenone	ok
	Y	Propiophenone	ok
	W	Acetanilide	ok
	W	Acetophenone	ok
	W	Propiophenone	ok
	F(X)	Acetanilide	ok
	F(X)	Acetophenone	ok
	F(X)	Propiophenone	ok

ThermoFisher S C I E N T I F I C

Chromeleon Operational Qualification, Part 2

Most Frequently Used Parameters: Comparison with Expected Results

Variable Category	Report Variable	Peak Name	Status
Peak Calibration	Residual for Cal.Point X	Acetanilide	ok
	Residual for Cal.Point X	Acetophenone	ok
	Residual for Cal.Point X	Propiophenone	ok
	Calibration Point Status	Acetanilide	ok
	Calibration Point Status	Acetophenone	ok
	Calibration Point Status	Propiophenone	ok
	Amount	Acetanilide	ok
	Amount	Acetophenone	ok
	Amount	Propiophenone	ok
	Cal.Type	Acetanilide	ok
Component	Peak Type	Acetanilide	ok
	Left Limit	Acetophenone	ok
	Right Limit	Acetanilide	ok
	Group	Acetanilide	ok
	Factor	Acetophenone	ok
	Amount	Acetanilide	ok
	Conc.Unit	Acetophenone	ok

ThermoFisher S C I E N T I F I C

Chromeleon Operational Qualification, Part 2

Most Frequently Used Parameters: Comparison with Expected Results

Variable Category	Report Variable	Peak Name	Status
Peak Purity	PPI	Acetanilide	ok
	PPI	Acetophenone	ok
	PPI	Propiophenone	ok
	RSD PPI	Acetanilide	ok
	RSD PPI	Acetophenone	ok
	RSD PPI	Propiophenone	ok
	Match	Acetanilide	ok
	Match	Acetophenone	ok
	Match	Propiophenone	ok
	RSD Match	Acetanilide	ok
	RSD Match	Acetophenone	ok
	RSD Match	Propiophenone	ok
	Rel.Max at	Acetanilide	ok
	Rel.Max at	Acetophenone	ok
	Rel.Max at	Propiophenone	ok

Test Result: Passed



Chromeleon Operational Qualification, Part 3
System Suitability Test: Comparison with Expected Results

Variable Category	Report Variable	Status
System Suitability Test Case	Number	ok
	Name	ok
	Inj. Condition	ok
	Eval. Formula	ok
	Operator	ok
	Statistics	ok
	Rounding	ok
	MinimumNumberOfInjections	ok
	MaximumNumberOfInjections	ok
	Channel	ok
	Peak	ok
	Ref. Value Formula 1	ok
	Ref. Value Formula 2	ok
	N.A.	ok
System Suitability Test Case Result	Inj. Eval. Result	ok
	Eval. Result	ok
	Peak Result	ok
	Injection Condition Result	ok
	Ref. Value 1	ok
	Ref. Value 2	ok
	Result	ok
	Message	ok
	Average	ok
	Count	ok
	Maximum	ok
	Minimum	ok
	Range	ok
	Rel. Range	ok
	Rel. Std. Dev.	ok
	Std. Dev.	ok
	Sum	ok

Test Result: Passed

PQ

Performance Qualification

Service Summary

These IQOQ Results should be reviewed by the Customer. If the IQOQ is accepted, both the Customer and the Service Representative should sign the IQOQ Results, below.

IQOQ Results

Based upon the actual results obtained, this IQOQ **PASSED** the acceptance criteria described in the Installation Qualification and Operational Qualification procedure.

Service Representative

A Field Service Representative signature below confirms the completion of all aspects of the Installation Qualification and Operational Qualification and have concluded that the system has been successfully verified to be operating as required.

Customer

A Customer signature below confirms the completion of all aspects of the Installation Qualification and Operational Qualification have been completed and that the system has been successfully verified to be operating as required.



Service Details

System Repeatability OQ Autosampler AS-DV 1 Test 1	PASSED
Carryover OQ Autosampler AS-DV 1 Test 1	PASSED
Flow Rate Repeatability OQ Pump Aquion 1 Test 1	PASSED
Noise Drift OQ Detector (Aquion CD) Conductivity Detector 1 Test 1	PASSED
Detector Linearity OQ Detector (Aquion CD) Conductivity Detector 1 Test 1	PASSED
EG Current OQ IC EG Aquion RFIC 1 Test 1	PASSED
Service Review and Completion	PASSED

Document Generation

This document was generated based on the system configuration being qualified.		RPGReports
Application Version		V3.4.8.0
Database Version		02.07.2025.001
Document Generated		09 - Mar - 2026
Service Representative Name		teerapat.b

Service Introduction

Introduction

Documented evidence must be provided to demonstrate the integrity of data collected and validate the results obtained on laboratory instrumentation.

Many laboratories achieve this by formal quality systems, which are generally implemented in accordance with one or more of the following recognized quality standards and other quality guidelines:

- Good Laboratory Practice (GLP)
- Current Good Manufacturing Practice (cGMP)
- International Organization for Standardization (ISO) guidelines
- United States Pharmacopeia (USP)

These standards are written in broad terms, to make them as widely applicable as possible. All stipulate general requirements specifying instruments must be fit for purpose, properly maintained, and calibrated to national or international standards. The procedure used for the Thermo Fisher Scientific qualification methodology is adapted to these standards.

This qualification is intended to be performed only by trained and certified individuals. This report was created for a Thermo Scientific system using the RPG Reports software.

Reference Documents

- Site Preparation Document(s)
- Individual Component Manuals
- Factory Installation Procedures

Test Equipment and Standards

Test Equipment

Equipment	Manufacturer	Model	Serial Number	Cal Ver Date	Good Until
IC Qualification Multimeter	Thermo Scientific FLUKE	Test Box II 289	22109053 32320105	n/a n/a	n/a n/a
Thermocouple	FLUKE	K Type	32320105	n/a	n/a

Test Standards and Solvents

Description	Manufacturer	Conc. / Grade	Part Number	Lot Number	Expiration Date
Nitrate	Thermo Scientific	5	060254	250414	Apr/2026
Nitrate	Thermo Scientific	10	060254	250414	Apr/2026
Nitrate	Thermo Scientific	25	060254	250414	Apr/2026
Nitrate	Thermo Scientific	50	060254	250414	Apr/2026
Nitrate	Thermo Scientific	100	060254	250414	Apr/2026
Nitrate	Thermo Scientific	1000	060254	250414	Apr/2026

Autosampler AS-DV 1

Autosampler Information

Autosampler Model	AS-DV
Serial Number	2205880126
Firmware Version	1.6.0
Instrument Assigned	Instrument 1
Tray Type	N/A
Syringe Volume	N/A
Loop Volume	25 µL
Connection	USB
Powered On Successfully?	Yes

System Information			
Model	AS-DV	Acquisition Date	N/A
Serial Number	2205880126	Sequence	N/A
System Name	N/A		
Test Configuration	Default		

Data Entry Mode	
Data Entry Mode	Import

Peak Results			
Sample Name	Injection Volume (uL)	Retention Time (min)	Area (uS*min)
Repeatability 1	25	0.185	2.512
Repeatability 2	25	0.1833	2.531
Repeatability 3	25	0.1833	2.528
Repeatability 4	25	0.185	2.554
Repeatability 5	25	0.1833	2.558
Repeatability 6	25	0.1833	2.555

Repeatability Results			
Test	Measured	OQ Limit	Result
Retention Time Result	0.5 % RSD	≤ 5.0 % RSD	PASSED
Area Result	0.7 % RSD	≤ 1.0 % RSD	PASSED

System Information			
Model	AS-DV	Acquisition Date	N/A
Serial Number	2205880126	Sequence	N/A
System Name	N/A		
Test Configuration	Default		

Data Entry Mode	
Data Entry Mode	Import

Peak Results			
Sample Name	Injection Volume (uL)	Retention Time (min)	Area (uS*min)
Blank	25	0.185	0.021
High	25	0.1833	43.512
Carryover	25	0.1833	0.02

Carryover Area Results			
Test	Measured	OQ Limit	Result
Carryover Area Result	0.00 %	≤ 0.10 %	PASSED

Pump Aquion 1

Pump Information

Pump Model	Aquion
Serial Number	221280114
Firmware Version	3.1.0
Pump Position	Single Unit
Seal Type	Normal Phase
Pressure Units	psi
Connection	USB
Powered On Successfully?	Yes

Flow Rate Repeatability OQ Pump Aquion 1 Test 1

System Information

Model	Aquion	Acquisition Date	N/A
Serial Number	221280114	Sequence	N/A
System Name	N/A	Pump Position	Single Unit
Test Configuration	Default		

Data Entry Mode

Data Entry Mode	Import
-----------------	--------

Peak Results

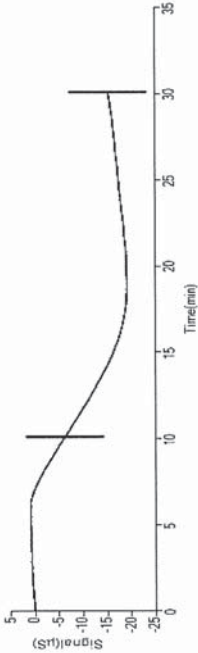
Sample Name	Injection Volume (uL)	Retention Time (min)
Repeatability 1	25	0.185
Repeatability 2	25	0.1833
Repeatability 3	25	0.1833
Repeatability 4	25	0.185
Repeatability 5	25	0.1833
Repeatability 6	25	0.1833

Repeatability Results

Test	Measured	OQ Limit	Result
Retention Time Result	0.5 % RSD	≤ 5.0 % RSD	PASSED

Detector Information

Detector Model	Aquion CD
Serial Number	221260053
Powered On Successfully?	Yes



System Information

Model		Aquion CD	Acquisition Date	N/A
Serial Number		221260053	Sequence	N/A
System Name		N/A		
Test Configuration		Default		

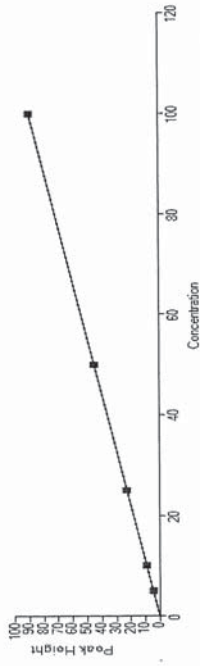
Data Entry Mode

Data Entry Mode	Import
-----------------	--------

Noise Drift Results

Test	Measured	OQ Limit	Result	Conversion Factor
Noise Result	0.1 nS	≤ 2.0 nS	PASSED	1000
Drift Result	17.7 nS/hr	≤ 20.0 nS/hr	PASSED	1000

Detector Linearity OQ Detector (Aquion CD)
Conductivity Detector 1 Test 1



System Information

Model	Aquion CD	Acquisition Date	N/A
Serial Number	221260053	Sequence	N/A
System Name	N/A		
Test Configuration	Default		

Data Entry Mode

Data Entry Mode	Import
-----------------	--------

Peak Results

Sample Name	Concentration (ppm)	Peak Height (μS)	Calculated
Detector Linear	5	4.868	4.983897
Detector Linear	10	9.29	9.945030
Detector Linear	25	22.754	25.050568
Detector Linear	50	45.04	50.053690
Detector Linear	100	89.529	99.966815

Linearity Results

Test	Measured	OQ Limit	Result
R ²	1.000	≥ 0.999	PASSED

IC EG Aquion RFIC 1

EG Information

Model	Aquion RFIC
Serial Number	221280114
Firmware Version	3.1.0
Cartridge Type	EGC III KOH
Instrument Assigned	Instrument 1
Connection	USB
Powered On Successfully?	Yes

System Information			
Model		Aquion RFIC	Acquisition Date
Serial Number		221280114	Sequence
System Name			
Test Configuration		KOH - Analytical	

Current Results				
Set Point	Expected Result	Reading	Deviation	OQ Limit
1.00 mM	1.61 mA	1.6100 mA	0.00 mA	± 0.01 mA
5.00 mM	8.04 mA	8.0400 mA	0.00 mA	± 0.05 mA
10.00 mM	16.08 mA	16.0800 mA	0.00 mA	± 0.10 mA
50.00 mM	80.41 mA	80.4200 mA	0.01 mA	± 0.50 mA
100.00 mM	160.81 mA	160.8300 mA	0.02 mA	± 1.00 mA

Service Results:
PASSED
This assessment was completed by a certified Service Representative after reviewing all performed service, including any testing performed per approved procedures, as documented in this report. The assessment is done prior to the generation of the final report, and does not preclude the customer's ultimate acceptance of this report.

Comments

Certificate

Certificate of Standards and Instruments for Qualification

Certificate of Analysis

Dionex Nitrate OQ/PQ IC Standards Kit (Set of 6)

Product Number 060254
Certificate of Analysis

Lot Number 250414

Expiration of Certification
April 2026

The Dionex Nitrate Standard was developed to aid the analysis of anions by Ion Chromatography (IC). The single-ion standard was prepared by the dissolution of high-purity salt in ≥ 18.2 megohm deionized water, which was tested by IC for ionic contaminants. The bottle label states the nominal concentration value of the ionic component for informational purposes only. The actual ion concentration value was determined by Ion Chromatography. The IC system was standardized using the National Institute of Standards & Technology (NIST), Standard Reference Material, SRM 3185 (Nitrate Standard Solution). Actual concentration values determined for the single-ion is listed below.

Dionex Nitrate Standard

Vial #	Concentration (mg/L)
1	5.10 $\pm$ 0.03
2	10.15 $\pm$ 0.04
3	25.49 $\pm$ 0.05
4	50.03 $\pm$ 0.06
5	99.7 $\pm$ 0.3
6	993 $\pm$ 18

The concentration value is based a proven reliable method of analysis. The estimated uncertainties are two standard deviations of the concentration value. The concentration value is warranted to be stable for one year from the date of manufacture.

The preparation and analyses of the Dionex Nitrate Standard was performed with extreme care by Thermo Scientific Corporation Consumables Manufacturing Department in Sunnyvale California.

Document No. 078690-01

20-Dec-2011

Learn more at thermofisher.com/documents

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CERTIFICATE OF CALIBRATION

Certificate No.: EL251725
Job No.: 25120018
Page: 1 of 5
Received Date: 08 Dec 2025
Calibrated Date: 09 Dec 2025
Issued Date: 09 Dec 2025
Tag No.: -
Service: -

Customer Name: Archemica Lab. Co., Ltd.
Customer Address: 39 Soi Sukhumvit 63 (Ekamai)
Sukhumvit Rd., North Klomlong,
Wattana, Bangkok 10110
Instrument Description: TRUE RMS MULTIMETER
Manufacturer: FLUKE
Model No.: 289
Serial Number: 32320105

Calibration Procedure:
Calibration were conducted using in-house calibration procedure according

Procedure No.: CP-EL-01, 02, 03, 04, 05, 06, 07, 10.
Comment:

Reference Standards Instrument	Model	Serial No.
Multi-Function Calibrator	Fluke 5500A	9395005
-	-	-
-	-	-

Traceability Information:
- Traceable to the International System of Units (SI) through the National Institute of Metrology (Thailand), NIMT.
Environmental Conditions:
Temperature: (23 +/- 3) °C
Relative Humidity: (50 +/- 15) %

Calibration Information:
- The result of calibration was found accurate as show on date and place of calibration only.
- The reported uncertainty of measurement is based on standard uncertainty multiplied by a coverage factor $k = 2$, providing confidence level of approximately 95%

Calibrated by: Mr. Suttinhan Pravin

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CERTIFICATE OF CALIBRATION

Certificate No.: EL251725
Page: 2 of 5

Range	Standard Value	UUC*Reading	Error	(±) Uncertainty
Function : DC Voltage Measurement (Without Adjustment)				
50 mV	0.0000 mV	0.0000 mV	0.0000 mV	0.00027 mV
50 mV	5.0000 mV	4.9991 mV	-0.0009 mV	0.00029 mV
50 mV	45.0000 mV	44.9991 mV	-0.0009 mV	0.00047 mV
50 mV	45.0000 mV	-45.011 mV	-0.011 mV	0.0047 mV
500 mV	50.0000 mV	50.00 mV	0.00 mV	0.00076 mV
500 mV	50.0000 mV	49.96 mV	-0.04 mV	0.0076 mV
500 mV	450.01 mV	-450.01 mV	-0.01 mV	0.023 mV
500 mV	450.0000 mV	0.5000 V	0.0000 V	0.00063 V
5 V	4.500000 V	4.4998 V	-0.0002 V	0.00023 V
5 V	4.500000 V	-4.4996 V	0.0004 V	0.00023 V
5 V	5.000000 V	5.0000 V	0.0000 V	0.00063 V
50 V	5.000000 V	-5.0000 V	0.0000 V	0.00063 V
50 V	25.000000 V	25.0000 V	0.0000 V	0.0012 V
50 V	45.000000 V	44.9999 V	-0.0001 V	0.0012 V
50 V	45.000000 V	-44.998 V	0.0020 V	0.0012 V
500 V	50.0000 V	50.00 V	0.00 V	0.0012 V
500 V	450.0000 V	449.99 V	-0.01 V	0.0012 V
500 V	450.0000 V	-449.98 V	0.02 V	0.0012 V
1000 V	100.0000 V	100.0 V	0.00 V	0.0012 V
1000 V	900.0000 V	899.9 V	-0.1 V	0.0012 V
1000 V	-900.0000 V	-899.9 V	0.1 V	0.0012 V
Function : DC Voltage Measurement LoZ (Without Adjustment)				
1000 V	0.0000000 V	0.0 V	0.00 V	0.0022 mV
1000 V	100.00000 V	100.0 V	0.00 V	0.033 mV
1000 V	900.0000 V	900.5 V	0.5 V	0.034 mV
1000 V	-900.0000 V	-900.5 V	-0.5 V	0.036 mV
Function : AC Voltage Measurement (Without Adjustment)				
50 mV	5.000 mV	4.983 mV	-0.007 mV	0.0022 mV
50 mV	45.000 mV	44.997 mV	-0.003 mV	0.033 mV
50 mV	45.000 mV	44.99 mV	-0.01 mV	0.034 mV
500 mV	50.000 mV	49.99 mV	-0.01 mV	0.036 mV
500 mV	450.00 mV	449.98 mV	-0.02 mV	0.16 mV
500 mV	450.00 mV	449.87 mV	-0.13 mV	0.16 mV
500 mV	450.0000 mV	0.4999 V	-0.0001 V	0.00018 V
5 V	0.500000 V	0.5000 V	0.0000 V	0.00019 V
5 V	4.50000 V	4.5012 V	0.0012 V	0.00019 V
5 V	4.50000 V	4.5012 V	0.0012 V	0.0021 V
50 V	5.00000 V	5.009 V	0.009 V	0.0063 V
50 V	25.00000 V	25.018 V	0.018 V	0.0063 V
50 V	45.00000 V	45.031 V	0.031 V	0.023 V
50 V	45.00000 V	45.020 V	0.020 V	0.023 V
500 V	50.0000 V	50.00 V	0.00 V	0.026 V
500 V	450.000 V	450.26 V	0.26 V	0.24 V
500 V	450.000 V	450.17 V	0.17 V	0.24 V
1000 V	100.000 V	100.00 V	0.00 V	0.024 V
1000 V	900.000 V	900.00 V	0.00 V	0.024 V

Remark : (*) UUC : Unit Under Calibration



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Certificate No. EL251725
Page. 3 of 5

Range	Standard Value	UUC*Reading	Error	(±) Uncertainty
Function : AC Voltage Measurement LoZ (Without Adjustment)				
1000 V	100.00 V	100.3 V	0.3 V	0.073 V
1000 V	900.00 V	904.2 V	4.2 V	0.42 V
Function : DC Current Measurement (Without Adjustment)				
500 uA	0.00 uA	0.00 uA	0.00 uA	0.040 uA
500 uA	50.00 uA	50.02 uA	0.02 uA	0.045 uA
500 uA	450.00 uA	450.00 uA	0.00 uA	0.085 uA
5000 uA	500.00 uA	500.0 uA	0.0 uA	0.11 uA
5000 uA	4500.0 uA	4499.6 uA	-0.4 uA	0.57 uA
50 mA	5.0000 mA	5.0000 mA	0.0000 mA	0.00082 mA
50 mA	45.0000 mA	44.995 mA	-0.005 mA	0.0051 mA
400 mA	200.0000 mA	199.96 mA	-0.04 mA	0.0051 mA
400 mA	360.0000 mA	359.96 mA	-0.04 mA	0.0051 mA
400 mA	-360.0000 mA	-359.94 mA	0.06 mA	0.0051 mA
5 A	0.50000 A	0.4999 A	-0.0001 A	0.00051 A
5 A	4.5000 A	4.5010 A	0.0010 A	0.00051 A
10 A	1.00000 A	1.000 A	0.000 A	0.00051 A
10 A	9.0000 A	9.001 A	0.001 A	0.00051 A
Function : AC Current Measurement (Without Adjustment)				
500 uA	50.00 uA	49.96 uA	-0.04 uA	0.033 uA
500 uA	450.0 uA	449.63 uA	-0.37 uA	0.033 uA
5000 uA	500.0 uA	499.86 uA	-0.14 uA	0.033 uA
5000 uA	4500.0 uA	4499.9 uA	-0.1 uA	0.033 uA
50 mA	5.0000 mA	4.991 mA	-0.009 mA	0.0055 mA
50 mA	45.0000 mA	44.955 mA	-0.045 mA	0.0055 mA
50 mA	450.0000 mA	44.963 mA	-0.037 mA	0.0055 mA
400 mA	40.0000 mA	40.000 mA	0.000 mA	0.0055 mA
400 mA	200.0000 mA	199.93 mA	-0.07 mA	0.0055 mA
400 mA	360.0000 mA	359.92 mA	-0.08 mA	0.0055 mA
5 A	0.50000 A	0.4991 A	-0.0009 A	0.00063 A
5 A	4.5000 A	4.4986 A	-0.0014 A	0.00063 A
5 A	1.00000 A	1.0000 A	0.0000 A	0.00063 A
10 A	9.0000 A	9.001 A	0.001 A	0.00063 A
10 A	9.0000 A	9.000 A	0.000 A	0.00063 A

Remark : (*) UUC : Unit Under Calibration



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CERTIFICATE OF CALIBRATION

Certificate No. EL251725
Page. 4 of 5

Range	Standard Value	UUC*Reading	Error	(±) Uncertainty
Function : Resistance Measurement (Without Adjustment)				
500 Ω	0.000 Ω	0.00 Ω	0.00 Ω	0.0085 Ω
500 Ω	50.000 Ω	50.05 Ω	0.05 Ω	0.017 Ω
500 Ω	450.00 Ω	449.96 Ω	-0.04 Ω	0.075 Ω
5 kΩ	0.50000 kΩ	0.4999 kΩ	-0.0001 kΩ	0.00010 kΩ
5 kΩ	4.5000 kΩ	4.4991 kΩ	-0.0009 kΩ	0.00079 kΩ
50 kΩ	5.0000 kΩ	5.000 kΩ	0.000 kΩ	0.00010 kΩ
50 kΩ	45.000 kΩ	45.000 kΩ	0.000 kΩ	0.00085 kΩ
500 kΩ	50.000 kΩ	50.01 kΩ	0.01 kΩ	0.011 kΩ
500 kΩ	450.00 kΩ	449.77 kΩ	-0.23 kΩ	0.095 kΩ
5 MΩ	0.50000 MΩ	0.4996 MΩ	-0.0004 MΩ	0.00012 MΩ
5 MΩ	4.5000 MΩ	4.4972 MΩ	-0.0028 MΩ	0.00026 MΩ
30 MΩ	3.00000 MΩ	2.998 MΩ	-0.002 MΩ	0.00070 MΩ
30 MΩ	27.0000 MΩ	26.994 MΩ	-0.006 MΩ	0.0022 MΩ
500 MΩ	5.0000 MΩ	4.99 MΩ	-0.01 MΩ	0.0064 MΩ
500 MΩ	45.000 MΩ	44.92 MΩ	-0.08 MΩ	0.18 MΩ
500 MΩ	330.000 MΩ	327.4 MΩ	-2.6 MΩ	0.18 MΩ
Function : Resistance Measurement LoZ (Without Adjustment)				
50 Ω	0.000 Ω	0.000 Ω	0.000 Ω	0.000 Ω
50 Ω	5.000 Ω	5.003 Ω	0.003 Ω	0.000 Ω
50 Ω	25.000 Ω	25.004 Ω	0.004 Ω	0.000 Ω
50 Ω	45.000 Ω	45.009 Ω	0.009 Ω	0.000 Ω
Function : Capacitance Measurement (Without Adjustment)				
1 nF	0.0000 nF	0.000 nF	0.000 nF	0.004 nF
1 nF	0.5000 nF	0.499 nF	-0.001 nF	0.075 nF
1 nF	0.9000 nF	0.899 nF	-0.001 nF	0.29 nF
10 nF	1.0000 nF	1.000 nF	0.000 nF	0.00064 nF
10 nF	9.000 nF	9.000 nF	0.000 nF	0.00064 nF
100 nF	10.000 nF	10.0 nF	0.0 nF	0.00064 nF
100 nF	90.00 nF	90.1 nF	0.1 nF	0.00064 nF
100 nF	0.10000 nF	0.100 nF	0.000 nF	0.00064 nF
1 μF	0.9000 μF	0.900 μF	0.000 μF	0.00064 μF
1 μF	0.9000 μF	1.000 μF	0.100 μF	0.0033 μF
10 μF	1.0000 μF	9.00 μF	-0.10 μF	0.0068 μF
10 μF	10.000 μF	10.0 μF	0.0 μF	0.44 μF
100 μF	90.00 μF	90.0 μF	0.0 μF	0.75 μF
1000 μF	100.00 μF	89.9 μF	-0.1 μF	7.3 μF
10 mF	900.0 μF	1.00 mF	0.000 mF	0.0099 mF

Remark : (*) UUC : Unit Under Calibration



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Certificate No. EL251725
Page. 5 of 5

Range	Standard Value	UUC*Reading	Error	(±) Uncertainty
Function : Frequency Measurement (Without Adjustment)				
100 Hz	10.00 Hz	@ 1 V	0.000 Hz	0.0012 Hz
100 Hz	90.00 Hz	@ 1 V	0.000 Hz	0.0026 Hz
1000 Hz	100.00 Hz	@ 1 V	0.000 Hz	0.0064 Hz
1000 Hz	900.0 Hz	@ 1 V	0.000 Hz	0.0200 Hz
10 kHz	1.0000 kHz	@ 1 V	0.0000 kHz	0.000062 kHz
10 kHz	9.0000 kHz	@ 1 V	0.0000 kHz	0.000019 kHz
100 kHz	10.0000 kHz	@ 1 V	0.0000 kHz	0.000061 kHz
100 kHz	90.0000 kHz	@ 1 V	0.0000 kHz	0.000019 kHz
1000 kHz	100.0000 kHz	@ 1 V	0.0000 kHz	0.000061 kHz
1000 kHz	500.00 kHz	@ 1 V	0.0000 kHz	0.0012 kHz

Range	Standard Value	Required UUC*Reading	Error	(±) Uncertainty
Function : Thermocouple Measurement K Type (Without Adjustment)				
-200 to 1350 °C	-5.550 mV	-180.0 °C	0.4 °C	0.40 °C
-200 to 1350 °C	0.000 mV	0.0 °C	0.2 °C	0.25 °C
-200 to 1350 °C	4.096 mV	100.0 °C	0.2 °C	0.22 °C
-200 to 1350 °C	24.905 mV	600.0 °C	0.2 °C	0.23 °C
-200 to 1350 °C	37.326 mV	900.0 °C	0.2 °C	0.24 °C
-200 to 1350 °C	48.838 mV	1200.0 °C	0.2 °C	0.26 °C

Remark : (*) UUC : Unit Under Calibration

END OF CALIBRATION



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Tel. +66(39) 694 145-8, Email : calibration@systronics.co.th



CERTIFICATE OF CALIBRATION

Certificate No. TL250426
Job No. 25120018
Page. 1 of 2

Customer Name : Archimex Lab Co., Ltd.
Customer Address : 39 Soi Sukhumvit 63 (Ehamai) Sukhumvit Rd.,
: North Klongton, Wattana,
: Bangkok 10110.
Received Date : 08 Dec 2025
Calibrated Date : 11 Dec 2025
Issued Date : 11 Dec 2025

Instrument Description : Digital Thermometer with sensor
Manufacturer : FLUKE
Model No. : 289
Serial Number : 32320105
Tag No. :
Service :
Condition As Received : Used Item

Calibration Procedure.
Calibration were conducted using in-house calibration procedure according to comparison measurement with
Platinum Resistance Thermometer (PRT) into temperature source.

Procedure No.
CP-TL-01

Comment.

Reference Standards Instrument.

Instrument Name	Model	Serial No.
Platinum Resistance Thermometer	5615	958332
Thermometer Readout	1529	B29720

Traceability Information.

The temperature scale used was based on ITS-90.
This certification is traceable to the International System of Units (SI).

Environmental Conditions

Temperature : (23 ± 3) °C

Calibration Information.

The result of calibration was found accurate and reliable.
The reported uncertainty of measurement is based on the calibration data, providing confidence level of approximately 95%.

Calibrated by : Nuttapon S.

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ILAC-MRA
No. 100-15-1309
CALIBRATION

CERTIFICATE OF CALIBRATION

Result of Calibration :

(Without Adjustment)

Parameter Setting : OFFSET = 0.0
Sensor of UUC* : Thermocouple Wire Type : K Serial No. : 32320105
Dimension : Length : 930 mm Diameter : 1.5 mm

Immersion Depth	Standard Reading	UUC* Reading	Correction Value	Uncertainty of Measurement ($\pm$)	Coverage Factor
mm	$^{\circ}\text{C}$	$^{\circ}\text{C}$	$^{\circ}\text{C}$	$^{\circ}\text{C}$	$k =$
150	0.0041	0.7	-0.7	0.50	2.00
150	50.0053	49.6	0.4	0.50	2.00
150	100.0055	99.4	0.6	0.50	2.00

UUC* : Unit Under Calibration

END OF CERTIFICATE

Thermo SCIENTIFIC

IC QUALIFICATION TEST BOX II

This certificate validates that the product values referenced below meet or exceed all Thermo Scientific functional specifications and release requirements.

Instrument Serial Number: 22109053
Instrument Part Number: 22000-60001

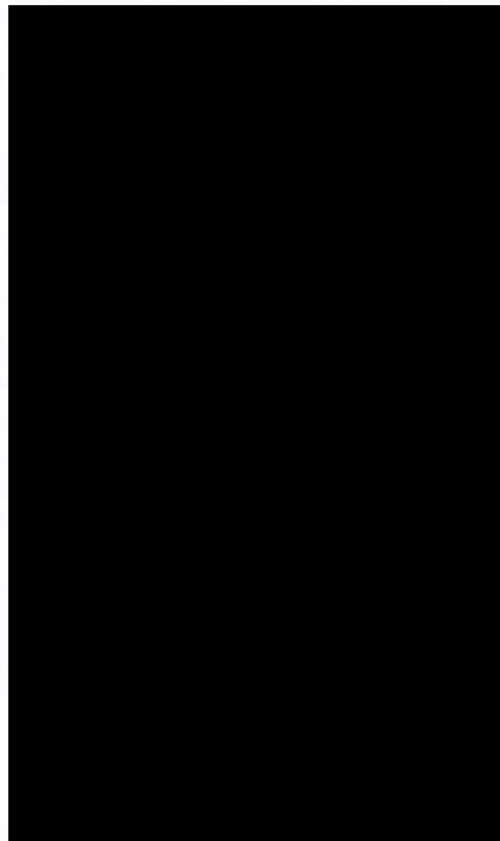
TEST BOX LOADS AND FUNCTIONS

[x] AES	100 Ω	+/- 5%	[x] CR-TC 3-pin ANA INT	1.3K Ω	+/- 5%
[x] EGC CAP KOH	100 Ω	+/- 5%	[x] CR-TC 3-pin CAP INT	13.05K Ω	+/- 1%
[x] EGC CAP MSA	100 Ω	+/- 5%	[x] CR-TC 4-pin ANA INT	1.3K Ω	+/- 5%
[x] EGC ANA KOH	100 Ω	+/- 5%	[x] CR-TC 4-pin CAP INT	13.05K Ω	+/- 1%
[x] EGC ANA MSA	100 Ω	+/- 5%	[x] EGC - Memory Test		
[x] ERS (CC)	12 Ω	+/- 5%	[x] ERS - Memory Test		
[x] ERC (CV)	250 Ω	+/- 5%	[x] CR-TC - Memory Test		

May 15, 2018

To whom it may concern,

Be advised that the IC Qualification Test Box II (P/N 22000-60001) no longer comes with a sticker labelled "Periodic Calibration Required". An IC Qualification Test Box II can be used without any re-calibration after shipment.



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Certificate of Completion

This certifies that



OJT RPG Mentoring: Ion Chromatography System Qualification Service Training

Issued electronically and
approved by:

Thermo Fisher University LMS
Certification Management and
Compliance Group
tmc.training@thermofisher.com

Valid for 3 years
Aug/26/2024