

Standard Installation Locations

Volume (Calibration Zone)= 422 (Liters)

Inside chamber: W = 110 (cm) D = 60 (cm) H = 160 (cm)

Standard Locations (#1, #2, #3, #4): w = 11 (cm) d = 6 (cm) h = 30 (cm)

Standard Locations (#5, #6, #7, #8): w = 11 (cm) d = 6 (cm) h = 30 (cm)

#9: Geometric center of the chamber

Position of Std	#1	#2	#3	#4	#5	#6	#7	#8	#9
Channel of Logger	201	202	203	204	205	206	207	208	209

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.

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

Delivering Growth - in Asia and Beyond.

CAL-FM-C31-10: 12 Sep 2022

Calibration Results:

Without adjustment

Measurement Temperature at Spread Locations, Indicating of Unit Under Calibration: 21 °C

Locations	Measured Temperature (°C)	Correction of UUC. (°C)	Uncertainty (± °C)
#1	20.39	-0.61	0.63
#2	20.32	-0.68	0.64
#3	20.39	-0.61	0.65
#4	20.34	-0.66	0.64
#5	20.00	-1.00	0.73
#6	20.05	-0.95	0.68
#7	20.08	-0.92	0.67
#8	20.10	-0.90	0.66
#9	20.07	-0.93	0.71

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	20	21	20.39	20.32	20.39	20.34	20.00	20.05	20.08	20.10	20.07	0.73

Chamber Characterization

Indicating (°C)	Measured Uniformity (°C)	Measured Stability (± °C)	Overall Variation (°C)
21	0.51	0.34	0.86

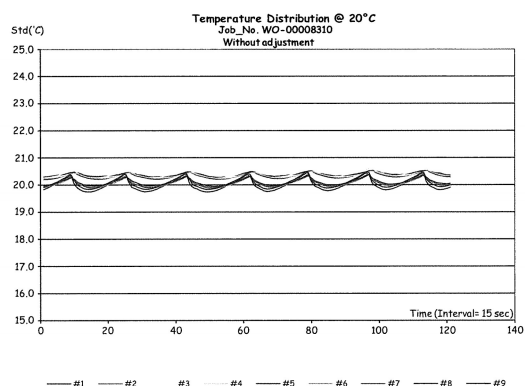
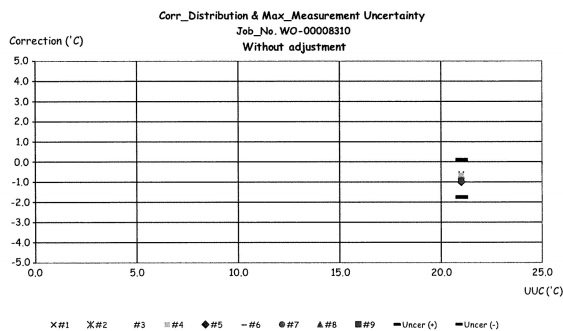
Note: * Maximum uncertainty of the each position

The End of Certificate

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CAL-FM-C31-10: 12 Sep 2022



ใบตรวจสอบสภาพเครื่องควบคุมอุณหภูมิ

เลขที่ใบงาน: WO-00008310

ชนิดเครื่องมือ: Cooled Incubator

รุ่น: E5CC

หมายเลขเครื่อง: 03021

ตรวจสอบ (รับ)	รายการตรวจเช็ค	ตรวจสอบ (ส่ง)	หมายเหตุ
30 Oct 2023		30 Oct 2023	
ปกติ	ไม่ปกติ	ปกติ	ไม่ปกติ
General			
<input checked="" type="checkbox"/>	<input type="checkbox"/> 1. สายไฟ	<input checked="" type="checkbox"/>	<input type="checkbox"/>
<input checked="" type="checkbox"/>	<input type="checkbox"/> 2. การทำงาน Main Switch	<input checked="" type="checkbox"/>	<input type="checkbox"/>
<input checked="" type="checkbox"/>	<input type="checkbox"/> 3. การทำงาน Selector Key	<input checked="" type="checkbox"/>	<input type="checkbox"/>
<input checked="" type="checkbox"/>	<input type="checkbox"/> 4. การแสดงผล Display	<input checked="" type="checkbox"/>	<input type="checkbox"/>
<input checked="" type="checkbox"/>	<input type="checkbox"/> 5. การทำงาน พัดลม	<input checked="" type="checkbox"/>	<input type="checkbox"/>
<input type="checkbox"/>	<input type="checkbox"/> 6. สภาพ Lever of Ventilation valve	<input type="checkbox"/>	<input type="checkbox"/> ไม่มี
<input checked="" type="checkbox"/>	<input type="checkbox"/> 7. สภาพ Lever door open / close	<input checked="" type="checkbox"/>	<input type="checkbox"/>
<input checked="" type="checkbox"/>	<input type="checkbox"/> 8. สภาพ Door seal	<input checked="" type="checkbox"/>	<input type="checkbox"/>
<input checked="" type="checkbox"/>	<input type="checkbox"/> 9. การทำงานของระบบ Safety	<input checked="" type="checkbox"/>	<input type="checkbox"/>
<input checked="" type="checkbox"/>	<input type="checkbox"/> 10. การทำงานของระบบทำความเย็น	<input checked="" type="checkbox"/>	<input type="checkbox"/>
<input type="checkbox"/>	<input type="checkbox"/> 11. การทำงานของระบบทำความร้อน	<input type="checkbox"/>	<input type="checkbox"/> ไม่มี
<input checked="" type="checkbox"/>	<input type="checkbox"/> 12. สภาพตัวเครื่อง	<input checked="" type="checkbox"/>	<input type="checkbox"/>
<input checked="" type="checkbox"/>	<input type="checkbox"/> 13. สภาพแวดล้อม ณ สถานที่ตั้งเครื่อง	<input checked="" type="checkbox"/>	<input type="checkbox"/>

ข้อแนะนำ :

Mr. Suphanimit Khamnonphoem
Service Engineer

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Certificate of Calibration

Certificate No.: C31232276

Page: 2 of 4

Equipment: Cooled Incubator
Model: i250
Serial No.(or ID): 0213-0004
Manufacturer: Accuplus
Condition: In Condition
Shelves(pc.): 4

Certificate No.: C31232276
Issued Date: 09 November 2023
Job No.: WO-00008310
Page: 1 of 4
Ventilation Valve: None

Customer: Integrated Research Center Co.,Ltd.
122 Moo 2, Tambol Thatoom,
Amphur Srimahaphote, Prachinburi 25140 Thailand

Environment Condition: Temperature: 24 °C ± 0.5 °C
Humidity: 52 %RH ± 5.3 %RH
Voltage: 231 VAC ± 3.6 VAC

Calibration Place: Double A (1991) Public Company Limited. (Water Laboratory IP1)
1 Moo 2, Thatoom, Srimahaphot,
Prachinburi 25140 Thailand.

Calibration By: Mr. Suphanimit Khamnonphoem
Calibration Date: 31 October 2023

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. C10230001

(Mr. Suphanimit Khamnonphoem)
Person in charge

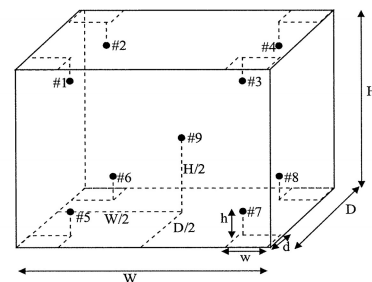
(Mr. Udon Srichana)
Authorized signatory

This certificate is issued the units of measurement according to the International System of Units (SI). It provides traceability of measurement to international or national standard or other recognized national standard laboratories.
The measurement uncertainty stated is the expanded uncertainty which is obtained from the standard uncertainty multiplied by the coverage factor (k=2) to provide a level of confidence of approximately 95%. It is determined in accordance with the Guide to Expression of Uncertainty in Measurement (GUM).
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.

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CAL-FM-C31-10: 12 Sep 2022



Standard Installation Locations

Volume (Calibration Zone)= 114 (Liters)

Inside chamber: W = 50 (cm) D = 48 (cm) H = 106 (cm)

Standard Locations (#1, #2, #3, #4): w = 5 (cm) d = 5 (cm) h = 20 (cm)

Standard Locations (#5, #6, #7, #8): w = 5 (cm) d = 5 (cm) h = 11 (cm)

#9: Geometric center of the chamber

Position of Std	#1	#2	#3	#4	#5	#6	#7	#8	#9
Channel of Logger	201	202	203	204	205	206	207	208	209

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.

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CAL-FM-C31-10: 12 Sep 2022

Certificate No.: C31232276

Page: 3 of 4

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	20.07	0.07	0.31
#2	20.09	0.09	0.37
#3	20.11	0.11	0.33
#4	19.91	-0.09	0.47
#5	19.99	-0.01	0.29
#6	19.97	-0.03	0.29
#7	20.02	0.02	0.34
#8	19.84	-0.16	0.30
#9	19.90	-0.10	0.35

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	20.07	20.09	20.11	19.91	19.99	19.97	20.02	19.84	19.90	0.47

Chamber Characterization

Indicating (°C)	Measured Uniformity (°C)	Measured Stability (± °C)	Overall Variation (°C)
20.0	0.25	0.37	0.84

Note: * Maximum uncertainty of the each position

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CAL-FM-C31-10: 12 Sep 2022

Certificate No.: C31232276

Page: 4 of 4

Without adjustment (Cont.)

Measurement Temperature at Spread Locations, Indicating of Unit Under Calibration: 29.0 °C

Locations	Measured Temperature (°C)	Correction of UUC. (°C)	Uncertainty (± °C)
#1	28.75	-0.25	0.30
#2	28.77	-0.23	0.33
#3	28.60	-0.40	0.29
#4	28.64	-0.36	0.38
#5	28.71	-0.29	0.28
#6	28.71	-0.29	0.28
#7	28.81	-0.19	0.31
#8	28.62	-0.38	0.30
#9	28.64	-0.36	0.34

Temperature Distribution

Desired (°C)	Setting (°C)	Indicating (°C)	Measured Temperature at Spread Locations (°C)									Uncertainty (± °C)*
29.0	29.0	29.0	28.75	28.77	28.60	28.64	28.71	28.71	28.81	28.62	28.64	0.38

Chamber Characterization

Indicating (°C)	Measured Uniformity (°C)	Measured Stability (± °C)	Overall Variation (°C)
29.0	0.22	0.28	0.70

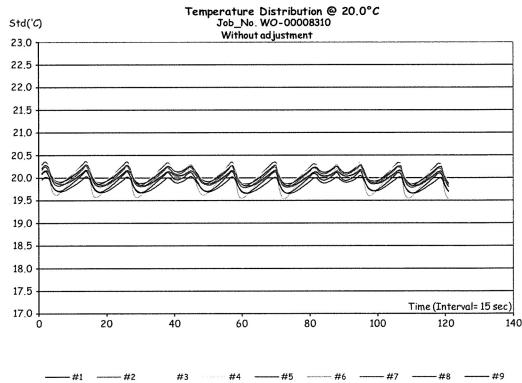
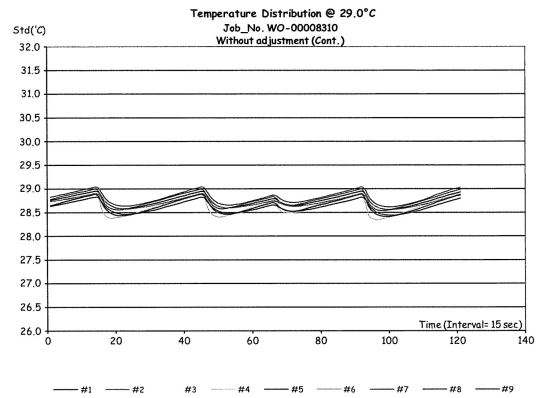
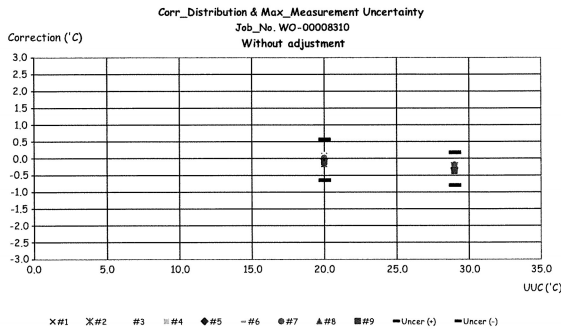
Note: * Maximum uncertainty of the each position

The End of Certificate

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CAL-FM-C31-10: 12 Sep 2022



ใบตรวจสอบสภาพเครื่องควบคุมอุณหภูมิ

เลขที่ใบงาน: WO-00008310

ชนิดเครื่อง: Cooled Incubator รุ่น: I250
หมายเลขเครื่อง: 0213-0004

ตรวจสอบ (วัน)	รายการตรวจเช็ค		ตรวจสอบ (ส่ง)	หมายเหตุ	
31 Oct 2023			31 Oct 2023		
ปกติ	ไม่ปกติ		ปกติ	ไม่ปกติ	
General					
<input checked="" type="checkbox"/>	<input type="checkbox"/>	1. สายไฟ	<input checked="" type="checkbox"/>	<input type="checkbox"/>	
<input checked="" type="checkbox"/>	<input type="checkbox"/>	2. การทำงาน Main Switch	<input checked="" type="checkbox"/>	<input type="checkbox"/>	
<input checked="" type="checkbox"/>	<input type="checkbox"/>	3. การทำงาน Selector Key	<input checked="" type="checkbox"/>	<input type="checkbox"/>	
<input checked="" type="checkbox"/>	<input type="checkbox"/>	4. การแสดงผล Display	<input checked="" type="checkbox"/>	<input type="checkbox"/>	
<input checked="" type="checkbox"/>	<input type="checkbox"/>	5. การทำงาน พัดลม	<input checked="" type="checkbox"/>	<input type="checkbox"/>	
<input type="checkbox"/>	<input type="checkbox"/>	6. สภาวะ Lever of Ventilation valve	<input type="checkbox"/>	<input type="checkbox"/>	ไม่มี
<input checked="" type="checkbox"/>	<input type="checkbox"/>	7. สภาวะ Lever door open / close	<input checked="" type="checkbox"/>	<input type="checkbox"/>	
<input checked="" type="checkbox"/>	<input type="checkbox"/>	8. สภาวะ Door seal	<input checked="" type="checkbox"/>	<input type="checkbox"/>	
<input checked="" type="checkbox"/>	<input type="checkbox"/>	9. การทำงานของระบบ Safety	<input checked="" type="checkbox"/>	<input type="checkbox"/>	
<input checked="" type="checkbox"/>	<input type="checkbox"/>	10. การทำงานของระบบทำความเย็น	<input checked="" type="checkbox"/>	<input type="checkbox"/>	
<input type="checkbox"/>	<input type="checkbox"/>	11. การทำงานของระบบทำความร้อน	<input type="checkbox"/>	<input type="checkbox"/>	ไม่มี
<input checked="" type="checkbox"/>	<input type="checkbox"/>	12. สภาวะตัวเครื่อง	<input checked="" type="checkbox"/>	<input type="checkbox"/>	
<input checked="" type="checkbox"/>	<input type="checkbox"/>	13. สภาวะแวดล้อม ณ สถานที่ตั้งเครื่อง	<input checked="" type="checkbox"/>	<input type="checkbox"/>	

ข้อแนะนำ: _____

Mr. Suphanimit Khamnonphoem
Service Engineer



Certificate of Calibration

Equipment: COD Reactor
Model: DRB200
Serial No. (or ID.): 19070C0337
Manufacturer: Hach
Condition: In Condition
Covers: Open (Max) Locations heating Block: Left and Right

Certificate No.: C17230188
Issued Date: 09 November 2023
Job No.: WO-00008310
Page: 1 of 5

Customer: Integrated Research Center Co.,Ltd.
122 Moo 2, Tambol Thatoom,
Amphur Srimahaphote, Prachinburi 25140 Thailand

Environment Condition: Temperature: 24 °C ± 0.7 °C
Humidity: 52 %RH ± 4.8 %RH
Voltage: 231 VAC ± 2.5 VAC

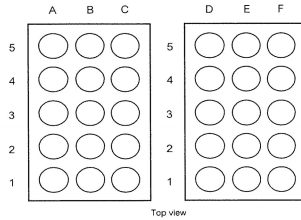
Calibration Place: Double A (1991) Public Company Limited. (Water Laboratory IP1)
1 Moo 2, Thatoom, Srimahaphot,
Prachinburi 25140 Thailand.

Calibration By: Mr. Suphanimit Khamnonphoem
Calibration Date: 31 October 2023
The Method used: In house method, base on Direct Measurement with Standard Thermometer
Traceability: This certificate is traceable to the SI Units maintained by National Institute of Metrology (NIMT), Thailand through DKSH Technology Limited. Certificate No. C10230001

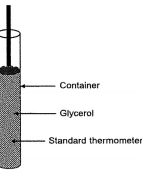
(Mr. Suphanimit Khamnonphoem)
Person in charge

(Mr. Udon Srichana)
Authorized signatory

This certificate is issued the units of measurement according to the International System of Units (SI). It provides traceability of measurement to international or national standard or other recognized national standard laboratories.
The measurement uncertainty stated is the expanded uncertainty which is obtained from the standard uncertainty multiplied by the coverage factor (k=2) to provide a level of confidence of approximately 95%. It is determined in accordance with the Guide to Expression of Uncertainty in Measurement (GUM).
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.



Location of standard



Sample test

Standard Installation Locations

The standard thermometer touches the lower end of the boring

Definitions

Indicating Temperature: The average reading of indicating device which forms the integral part of the unit under calibration.

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

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

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CAL-FM-C17-08: 20 Jul 2022

Calibration Results:

Without Adjustment

Measured temperature at the spread locations:

Locations heating Block:	Setting (°C)	Unit Under Calibration (°C)
Left	150	150
Right	150	150

Location heating Block:	Measured Temperature (°C)	Correction of UUC (°C)	Uncertainty (± °C)
A1	149.09	-0.91	0.65
A2	149.43	-0.57	0.66
A3	151.24	1.24	0.65
A4	149.63	-0.37	0.65
A5	150.71	0.71	0.65
B1	150.14	0.14	0.65
B2	150.06	0.06	0.65
B3	150.35	0.35	0.65
B4	149.97	-0.03	0.66
B5	150.01	0.01	0.66
C1	150.08	0.08	0.65
C2	150.23	0.23	0.69
C3	151.13	1.13	0.65
C4	150.61	0.61	0.65
C5	149.47	-0.53	0.66
D1	150.36	0.36	0.65
D2	150.87	0.87	0.65
D3	151.24	1.24	0.65
D4	150.73	0.73	0.65
D5	151.10	1.10	0.65
E1	148.88	-1.12	0.65
E2	153.51	3.51	0.65
E3	149.55	-0.45	0.65
E4	147.55	-2.45	0.65
E5	148.94	-1.06	0.65
F1	149.97	-0.03	0.65
F2	151.10	1.10	0.65
F3	150.87	0.87	0.66
F4	150.55	0.55	0.65
F5	150.24	0.24	0.65

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CAL-FM-C17-08: 20 Jul 2022

Characterization of the unit under calibration:

Locations heating Block:	Desired (°C)	Unit Under Calibration (°C)	Measured Temperature (°C)
		Setting	Reading
Left	150	150	150
Right	150	150	150
			Stability (±°C)
			0.14
			0.09

The End of Certificate

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CAL-FM-C17-08: 20 Jul 2022

ใบตรวจสอบสภาพเครื่องควบคุมอุณหภูมิ

เลขที่ใบงาน: WO-00008310

ชนิดเครื่องมือ: COD Reactor

รุ่น: DRB200

หมายเลขเครื่อง: 19070C0337

ตรวจสอบ (รับ)	ตรวจสอบ (ส่ง)	หมายเหตุ
31 Oct 2023	31 Oct 2023	
ปกติ	ปกติ	
ไม่ปกติ	ไม่ปกติ	
General		
<input checked="" type="checkbox"/>	<input type="checkbox"/>	1. สายไฟ
<input checked="" type="checkbox"/>	<input type="checkbox"/>	2. การทำงาน Main Switch
<input checked="" type="checkbox"/>	<input type="checkbox"/>	3. การทำงาน Selector Key
<input checked="" type="checkbox"/>	<input type="checkbox"/>	4. การแสดงผล Display
<input checked="" type="checkbox"/>	<input type="checkbox"/>	5. สภาพ Hole
<input checked="" type="checkbox"/>	<input type="checkbox"/>	6. สภาพฝาปิด
<input checked="" type="checkbox"/>	<input type="checkbox"/>	7. สภาพตัวเครื่อง
<input checked="" type="checkbox"/>	<input type="checkbox"/>	8. สภาพแวดล้อม ณ สถานที่ตั้งเครื่อง

ข้อแนะนำ:

Mr. Suphanimit Khamnonphoom
Service Engineer

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DKSH Technology Limited
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Certificate of Calibration

Fig. 1.: Top view

Equipment: Block Digestion Unit
Model: SC2100-35V240
Serial No. (or ID.): 2021CEP296
Manufacturer: Environmental Express
Condition: In Condition

Certificate No.: C29230040
Issued Date: 16 November 2023
Job No.: WO-00008310
Page: 1 of 3
Digestion Block: 18 holes.

Customer: Integrated Research Center Co.,Ltd.
122 Moo 2, Tambol Thatoom,
Amphur Srimahaphote, Prachinburi 25140 Thailand

Environment Condition: Temperature: 26 °C ± 0.7 °C
Humidity: 54 %RH ± 5.3 %RH
Voltage: 230 VAC ± 3.5 VAC

Calibration Place: Double A (1991) Public Company Limited. (Water Laboratory IP1)
1 Moo 2, Thatoom, Srimahaphot,
Prachinburi 25140 Thailand.

Calibration By: Mr. Suphanimit Khamnonphoem
Calibration Date: 31 October 2023
The Method used: In house method, base on by comparison with standard
Traceability: This certificate is traceable to the SI Units maintained by National Institute of Metrology (NIMT), Thailand through N.M. Technical Center Laboratory (NTL)
Certificate No.: TC22/0080

(Mr. Suphanimit Khamnonphoem)
Person in charge

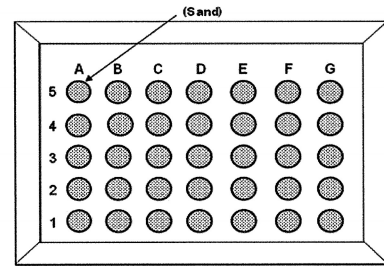
(Mr. Udon Srichana)
Authorized signatory

This certificate is issued the units of measurement according to the International System of Units (SI). It provides traceability of measurement to international or national standard or other recognized national standard laboratories.
The measurement uncertainty stated is the expanded uncertainty which is obtained from the standard uncertainty multiplied by the coverage factor (k=2) to provide a level of confidence of approximately 95%. It is determined in accordance with the Guide to Expression of Uncertainty in Measurement (GUM).
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Location of standard

Definitions

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

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

Calibration Results:

Before adjustment

Locations	Desired (°C)	Setting (°C)	Indicating (°C)	Measured Temperature (°C)	Correction of UUC (°C)	Uncertainty (± °C)
A1	104.0	104.0	104.0	98.4	-5.6	1.4
A3				99.0	-5.0	1.4
A5				99.1	-4.9	1.4
B2				98.5	-5.5	1.4
B4				98.6	-5.4	1.4
C1				99.0	-5.0	1.4
C3				98.3	-5.7	1.4
C5				98.4	-5.6	1.4
D2				99.4	-4.6	1.4
D4				99.0	-5.0	1.4
E1				99.4	-4.6	1.4
E3				98.5	-5.5	1.4
E5				98.3	-5.7	1.4
F2				99.6	-4.4	1.4
F4				99.0	-5.0	1.4
G1				99.3	-4.7	1.4
G3				98.3	-5.7	1.4
G5				98.6	-5.4	1.4

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Calibration Results:

After adjustment

Locations	Desired (°C)	Setting (°C)	Indicating (°C)	Measured Temperature (°C)	Correction of UUC (°C)	Uncertainty (± °C)
A1	95.0	95.0	95.0	94.5	-0.5	1.4
A3				95.2	0.2	1.4
A5				94.8	-0.2	1.4
B2				95.3	0.3	1.4
B4				95.0	0.0	1.4
C1				95.3	0.3	1.4
C3				95.0	0.0	1.4
C5				94.6	-0.4	1.4
D2				95.2	0.2	1.4
D4				95.0	0.0	1.4
E1				95.4	0.4	1.4
E3				95.0	0.0	1.4
E5				94.5	-0.5	1.4
F2				94.4	-0.6	1.4
F4				95.2	0.2	1.4
G1				95.1	0.1	1.4
G3				95.5	0.5	1.4
G5				95.0	0.0	1.4

Locations	Desired (°C)	Setting (°C)	Indicating (°C)	Measured Temperature (°C)	Correction of UUC (°C)	Uncertainty (± °C)
A1	104.0	104.0	104.0	103.8	-0.2	1.4
A3				104.2	0.2	1.4
A5				104.3	0.3	1.4
B2				103.9	-0.1	1.4
B4				103.9	-0.1	1.4
C1				104.2	0.2	1.4
C3				103.5	-0.5	1.4
C5				103.7	-0.3	1.4
D2				104.4	0.4	1.4
D4				104.0	0.0	1.4
E1				104.5	0.5	1.4
E3				103.8	-0.2	1.4
E5				103.2	-0.8	1.4
F2				104.6	0.6	1.4
F4				104.1	0.1	1.4
G1				104.3	0.3	1.4
G3				103.6	-0.4	1.4
G5				103.8	-0.2	1.4

The End of Certificate

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ใบตรวจสอบสภาพเครื่องควบคุมอุณหภูมิ

เลขที่ใบงาน: WO-00008310

ชนิดเครื่องมือ: Block Digestion Unit รุ่น: SC2100-35V240

หมายเลขเครื่อง: 2021CEP296

ตรวจสอบ (รับ)	รายการตรวจเช็ค	ตรวจสอบ (ส่ง)		หมายเหตุ
		31 Oct 2023	31 Oct 2023	
ปกติ	ไม่ปกติ	ปกติ	ไม่ปกติ	
General				
<input checked="" type="checkbox"/>	<input type="checkbox"/> 1. สายไฟ	<input checked="" type="checkbox"/>	<input type="checkbox"/>	
<input checked="" type="checkbox"/>	<input type="checkbox"/> 2. การทำงาน Main Switch	<input checked="" type="checkbox"/>	<input type="checkbox"/>	
<input checked="" type="checkbox"/>	<input type="checkbox"/> 3. การทำงาน Selector Key	<input checked="" type="checkbox"/>	<input type="checkbox"/>	
<input checked="" type="checkbox"/>	<input type="checkbox"/> 4. การแสดงผล Display	<input checked="" type="checkbox"/>	<input type="checkbox"/>	
<input checked="" type="checkbox"/>	<input type="checkbox"/> 5. สภาพ Hole	<input checked="" type="checkbox"/>	<input type="checkbox"/>	
<input type="checkbox"/>	<input type="checkbox"/> 6. สภาพหน้าปิด	<input type="checkbox"/>	<input type="checkbox"/>	ไม่มี
<input checked="" type="checkbox"/>	<input type="checkbox"/> 7. สภาพตัวเครื่อง	<input checked="" type="checkbox"/>	<input type="checkbox"/>	
<input checked="" type="checkbox"/>	<input type="checkbox"/> 8. สภาวะแวดล้อม ณ สถานที่ตั้งเครื่อง	<input checked="" type="checkbox"/>	<input type="checkbox"/>	

ข้อแนะนำ:

Mr. Suphanimit Khamnonphoem
Service Engineer

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Certificate of Calibration

Certificate No.: C29230041

Page: 2 of 3

Equipment: Block Digestion Unit
Model: KT 20s-BS
Serial No. (or ID.): GER5720190108
Manufacturer: Gerhardt
Condition: In Condition

Certificate No.: C29230041
Issued Date: 16 November 2023
Job No.: WO-00008310
Page: 1 of 3
Digestion Block: 20 holes.

Customer: Integrated Research Center Co.,Ltd.
122 Moo 2, Tambol Thatoom,
Amphur Srimahaphote, Prachinburi 25140 Thailand

Environment Condition: Temperature: 26 °C ± 0.7 °C
Humidity: 54 %RH ± 4.7 %RH
Voltage: 230 VAC ± 3.5 VAC

Calibration Place: Double A (1991) Public Company Limited. (Water Laboratory IP1)
1 Moo 2, Thatoom, Srimahaphot,
Prachinburi 25140 Thailand.

Calibration By: Mr. Suphanimit Khamnonphoem
Calibration Date: 01 November 2023
The Method used: In house method, base on by comparison with standard
Traceability: This certificate is traceable to the SI Units maintained by National Institute of Metrology (NIMT), Thailand through N.M. Technical Center Laboratory (NTL)
Certificate No.: TC22/0080

(Mr. Suphanimit Khamnonphoem)
Person in charge

(Mr. Udon Srichana)
Authorized signatory

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CAL-FM-C29-07: 20 Jul 2022

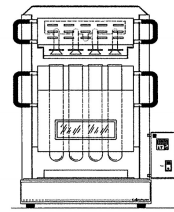
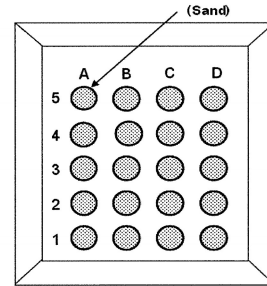


Fig. 1.: Front view



Location of standard

Fig. 2.: Digestion block

Definitions

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

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

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Certificate No.: C29230041

Page: 3 of 3

Calibration Results:
Without adjustment

Locations	Desired (°C)	Setting (°C)	Indicating (°C)	Measured Temperature (°C)	Correction of UUC. (°C)	Uncertainty (\pm °C)
A1	380	380	380	380.8	0.8	1.5
A2				381.1	1.1	1.5
A3				380.9	0.9	1.5
A4				381.1	1.1	1.5
A5				381.2	1.2	1.5
B1				380.0	0.0	1.5
B2				380.6	0.6	1.5
B3				380.1	0.1	1.5
B4				380.4	0.4	1.5
B5				380.8	0.8	1.5
C1				379.3	-0.7	1.5
C2				379.4	-0.6	1.5
C3				379.8	-0.2	1.5
C4				380.0	0.0	1.5
C5				379.9	-0.1	1.5
D1				376.7	-3.3	1.5
D2				376.9	-3.1	1.5
D3				377.9	-2.1	1.5
D4				378.6	-1.4	1.5
D5				377.5	-2.5	1.5

The End of Certificate

ใบตรวจสอบสภาพเครื่องควบคุมอุณหภูมิ

เลขที่ใบงาน: WO-00008310

ชนิดเครื่องมือ: Block Digestion Unit รุ่น: KT 20s-BS

หมายเลขเครื่อง: GER5720190108

ตรวจสอบ (รับ)		รายการตรวจเช็ค	ตรวจสอบ (ส่ง)		หมายเหตุ
01 Nov 2023			01 Nov 2023		
ปกติ	ไม่ปกติ		ปกติ	ไม่ปกติ	
		General			
<input checked="" type="checkbox"/>	<input type="checkbox"/>	1. สายไฟ	<input checked="" type="checkbox"/>	<input type="checkbox"/>	
<input checked="" type="checkbox"/>	<input type="checkbox"/>	2. การทำงาน Main Switch	<input checked="" type="checkbox"/>	<input type="checkbox"/>	
<input checked="" type="checkbox"/>	<input type="checkbox"/>	3. การทำงาน Selector Key	<input checked="" type="checkbox"/>	<input type="checkbox"/>	
<input checked="" type="checkbox"/>	<input type="checkbox"/>	4. การแสดงผล Display	<input checked="" type="checkbox"/>	<input type="checkbox"/>	
<input checked="" type="checkbox"/>	<input type="checkbox"/>	5. สภาพ Hole	<input checked="" type="checkbox"/>	<input type="checkbox"/>	
<input type="checkbox"/>	<input type="checkbox"/>	6. สภาพฝาปิด	<input type="checkbox"/>	<input type="checkbox"/>	ไม่มี
<input checked="" type="checkbox"/>	<input type="checkbox"/>	7. สภาพตัวเครื่อง	<input checked="" type="checkbox"/>	<input type="checkbox"/>	
<input checked="" type="checkbox"/>	<input type="checkbox"/>	8. สภาวะแวดล้อม ณ สถานที่ตั้งเครื่อง	<input checked="" type="checkbox"/>	<input type="checkbox"/>	

ข้อเสนอแนะ:

Mr. Suphanimit Khamnonphoem
Service Engineer

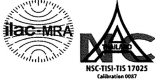
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Certificate of Calibration

Certificate No.: C02232073

Page 2 of 2

Calibration Results:

Nominal Value	Marking	Conventional Mass	Uncertainty (\pm mg)	MPE Class (\pm mg)
1 g	None	1 g + 0.043 mg	0.030	0.10 F1

Note : These MPE Class are only conventional mass.

The End of Certificate

Equipment: Standard Weight
Model: 1 g
Serial No. (or ID.): Weight 001
Manufacturer: LS
Condition: In condition
Certificate No.: C02232073
Issued Date: 7 November 2023
Job No.: WO-00009104
Page: 1 of 2
Class: -

Customer: Integrated Research Center Co.,Ltd.
 122 Moo 2, Tambol Thatoom,
 Amphur Srimahaphote, Prachinburi 25140 Thailand

Environment Condition: Temperature 22 °C \pm 2 °C
 Relative Humidity 50 %RH \pm 10 %RH
 Atmospheric Pressure 980-1030 mbar

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

Calibration By: Mr. Palchet Saefong

Calibration Date: 07 November 2023

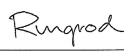
The Method used: In house method, CAL-WI-48, base on OIML R111-1

Traceability: This certificate is traceable to the SI Units maintained by National Institute of Metrology (Thailand), NIMT through DKSH Technology Limited. Certificate No. C02231914.



(Mr. Palchet Saefong)

Person in charge



(Mr. Rungrod Jenkitrakulchai)

Authorized signatory

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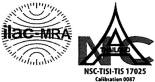
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CAL-FM-C02-12: 12 Sep 2022

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CAL-FM-C02-12: 12 Sep 2022



Certificate of Calibration

Certificate No.: C02232074

Page 2 of 2

Calibration Results:

Nominal Value	Marking	Conventional Mass	Uncertainty (\pm mg)	MPE Class (\pm mg)
100 g	None	100 g - 0.06 mg	0.16	0.5 F1

Note : These MPE Class are only conventional mass.

The End of Certificate

Equipment: Standard Weight
Model: 100 g
Serial No. (or ID.): Weight 002
Manufacturer: LS
Condition: In condition
Certificate No.: C02232074
Issued Date: 7 November 2023
Job No.: WO-00009104
Page: 1 of 2
Class: -

Customer: Integrated Research Center Co.,Ltd.
 122 Moo 2, Tambol Thatoom,
 Amphur Srimahaphote, Prachinburi 25140 Thailand

Environment Condition: Temperature 22 °C \pm 2 °C
 Relative Humidity 50 %RH \pm 10 %RH
 Atmospheric Pressure 980-1030 mbar

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

Calibration By: Mr. Palchet Saefong

Calibration Date: 07 November 2023

The Method used: In house method, CAL-WI-48, base on OIML R111-1

Traceability: This certificate is traceable to the SI Units maintained by National Institute of Metrology (Thailand), NIMT through DKSH Technology Limited. Certificate No. C02231914.



(Mr. Palchet Saefong)

Person in charge



(Mr. Rungrod Jenkitrakulchai)

Authorized signatory

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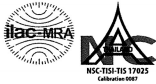
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CAL-FM-C02-12: 12 Sep 2022

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Certificate of Calibration

Certificate No.: C02232075

Page 2 of 2

Calibration Results:

Nominal Value	Marking	Conventional Mass	Uncertainty (\pm mg)	MPE Class (\pm mg)
200 g	None	200 g - 0.36 mg	0.30	1.0 F1

Note : These MPE Class are only conventional mass.

The End of Certificate

Equipment: Standard Weight
Model: 200 g
Serial No. (or ID.): Weight 003
Manufacturer: LS
Condition: In condition
Certificate No.: C02232075
Issued Date: 7 November 2023
Job No.: WO-00009104
Page: 1 of 2
Class: -

Customer: Integrated Research Center Co.,Ltd.
122 Moo 2, Tambol Thatoom,
Amphur Srimahaphote, Prachinburi 25140 Thailand

Environment Condition: Temperature 22 °C \pm 2 °C
Relative Humidity 50 %RH \pm 10 %RH
Atmospheric Pressure 980-1030 mbar

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

Calibration By: Mr. Palchet Saefong

Calibration Date: 07 November 2023

The Method used: In house method, CAL-WI-48, base on OIML R111-1

Traceability: This certificate is traceable to the SI Units maintained by National Institute of Metrology (Thailand), NIMT through DKSH Technology Limited. Certificate No. C02231914.

Palchet Saefong

(Mr. Palchet Saefong)

Person in charge

Rungrod Jenkitrakulchai

(Mr. Rungrod Jenkitrakulchai)

Authorized signatory

This certificate is issued the units of measurement according to the International System of Units (SI). It provides traceability of measurement to international or national standard or other recognized national standard laboratories.
The measurement uncertainty stated is the expanded uncertainty which is obtained from the standard uncertainty multiplied by the coverage factor ($k=2$) to provide a level of confidence of approximately 95%. It is determined in accordance with the Guide to Expression of Uncertainty in Measurement (GUM).
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CAL-FM-C02-12: 12 Sep 2022

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CAL-FM-C02-12: 12 Sep 2022



Certificate of Calibration

Certificate No.: C17230199

Page: 2 of 4

Equipment: COD Reactor
Model: DRB 200
Serial No. (or ID.): 19050C0191
Manufacturer: Hach
Condition: In Condition
Covers: Open (Max) Locations heating Block: Left and Right
Certificate No.: C17230199
Issued Date: 21 November 2023
Job No.: WO-00010182
Page: 1 of 4

Customer: Integrated Research Center Co.,Ltd.
122 Moo 2, Tambol Thatoom,
Amphur Srimahaphote, Prachinburi 25140 Thailand

Environment Condition: Temperature: 23 °C \pm 5.0 °C
Humidity: 50 %RH \pm 15.0 %RH
Voltage: 230 VAC \pm 11.0 VAC

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

Calibration By: Mr. Bovon Jannantha

Calibration Date: 20 November 2023

The Method used: In house method, base on Direct Measurement with Standard Thermometer

Traceability: This certificate is traceable to the SI Units maintained by National Institute of Metrology (NIMT), Thailand through DKSH Technology Limited. Certificate No. C10230015

Bovon Jannantha

(Mr. Bovon Jannantha)

Person in charge

Udon Srichana

(Mr. Udon Srichana)

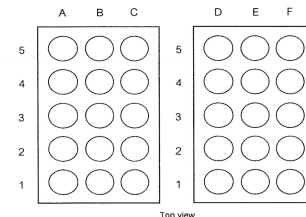
Authorized signatory

This certificate is issued the units of measurement according to the International System of Units (SI). It provides traceability of measurement to international or national standard or other recognized national standard laboratories.
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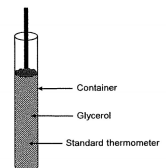
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CAL-FM-C17-08: 26 Jul 2022



Location of standard



Sample test

Standard Installation Locations

The standard thermometer touches the lower end of the boring

Definitions

Indicating Temperature: The average reading of indicating device which forms the integral part of the unit under calibration.

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

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

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CAL-FM-C17-08: 20 Jul 2022

Calibration Results:

Without Adjustment

Measured temperature at the spread locations:

Locations heating Block:	Setting (°C)	Unit Under Calibration (°C)
Left	150	150
Right	150	150

Location heating Block:	Measured Temperature (°C)	Correction of UUC (°C)	Uncertainty (± °C)
A1	148.65	-1.35	0.68
A2	151.14	1.14	0.67
A3	151.18	1.18	0.66
A4	148.99	-1.01	0.69
A5	149.00	-1.00	0.68
B1	151.08	1.08	0.68
B2	150.79	0.79	0.69
B3	151.35	1.35	0.66
B4	149.39	-0.61	0.69
B5	149.77	-0.23	0.68
C1	151.06	1.06	0.69
C2	151.21	1.21	0.69
C3	150.16	0.16	0.67
C4	149.48	-0.52	0.68
C5	148.75	-1.25	0.67
D1	150.34	0.34	0.67
D2	150.48	0.48	0.68
D3	149.47	-0.53	0.67
D4	148.70	-1.30	0.69
D5	149.29	-0.71	0.67
E1	150.64	0.64	0.66
E2	148.93	-1.07	0.69
E3	151.31	1.31	0.67
E4	149.17	-0.83	0.65
E5	148.46	-1.54	0.68
F1	149.08	-0.92	0.65
F2	149.23	-0.77	0.65
F3	148.69	-1.31	0.65
F4	148.23	-1.77	0.65
F5	149.71	-0.29	0.65

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CAL-FM-C17-08: 20 Jul 2022

Characterization of the unit under calibration:

Locations heating Block:	Desired	Unit Under Calibration (°C)		Measured Temperature (°C)
	(°C)	Setting	Reading	Stability (±°C)
Left	150	150	150	0.22
Right	150	150	150	0.22

The End of Certificate

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CAL-FM-C17-08: 20 Jul 2022

ใบตรวจสอบสภาพเครื่องควบคุมอุณหภูมิ

เลขที่ใบงาน: WO-00010182

ชนิดเครื่องมือ: COD Reactor

รุ่น: DRB 200

หมายเลขเครื่อง: 19050C0191

ตรวจสอบ (รับ)		รายการตรวจเช็ค	ตรวจสอบ (ส่ง)		หมายเหตุ
20 Nov 2023			20 Nov 2023		
ปกติ	ไม่ปกติ		ปกติ	ไม่ปกติ	
		General			
<input checked="" type="checkbox"/>	<input type="checkbox"/>	1. สายไฟ	<input checked="" type="checkbox"/>	<input type="checkbox"/>	
<input checked="" type="checkbox"/>	<input type="checkbox"/>	2. การทำงาน Main Switch	<input checked="" type="checkbox"/>	<input type="checkbox"/>	
<input checked="" type="checkbox"/>	<input type="checkbox"/>	3. การทำงาน Selector Key	<input checked="" type="checkbox"/>	<input type="checkbox"/>	
<input checked="" type="checkbox"/>	<input type="checkbox"/>	4. การแสดงผล Display	<input checked="" type="checkbox"/>	<input type="checkbox"/>	
<input checked="" type="checkbox"/>	<input type="checkbox"/>	5. สภาพ Hole	<input checked="" type="checkbox"/>	<input type="checkbox"/>	
<input checked="" type="checkbox"/>	<input type="checkbox"/>	6. สภาพฝาปิด	<input checked="" type="checkbox"/>	<input type="checkbox"/>	
<input checked="" type="checkbox"/>	<input type="checkbox"/>	7. สภาพตัวเครื่อง	<input checked="" type="checkbox"/>	<input type="checkbox"/>	
<input checked="" type="checkbox"/>	<input type="checkbox"/>	8. สภาวะแวดล้อม ณ สถานที่ตั้งเครื่อง	<input checked="" type="checkbox"/>	<input type="checkbox"/>	

ข้อเสนอแนะ:

Mr. Bovon Jannantha
Service Engineer

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DKSH Technology Limited
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Certificate of Calibration

Equipment:	TURBIDIMETER	Certificate No.:	C08230180
Model:	2100Q	Issued Date:	03 November 2023
Serial No. (or ID.):	14090C035505	Job No.:	WO-00008310
Manufacturer:	HACH	Page:	1 of 2
Condition:	In Condition		
Customer:	Integrated Research Center Co.,Ltd. 122 Moo 2, Tambol Thatoom, Amphur Srimahaphote, Prachinburi 25140 Thailand		
Environment Condition:	Temperature 26 °C ± 0.3 °C Humidity 63 %RH ± 3 %RH		
Calibration Place:	Double A (1991) Public Company Limited. (Water Laboratory IP1) 1 Moo 2, Thatoom, Srimahaphot, Prachinburi 25140 Thailand.		
Calibration By:	Mr.Piyapat Saidoung		
Calibration Date:	01 November 2023		
The Method used:	In house method, CAL-WI-23, base on Hach Manufacturer Method 8195		
Traceability:	This certificate is traceable to Primary standard Fromazin and StabiCal accepted by United States Environmental Protection Agency (EPA) through Hach Company Certificate No. A2005 , A3004 , A3012 , A3004		

ปิยพัฏฐ์
(Mr. Piyapat Saidoung)
Person in charge

นิตินันท์
(Mr. Nitinun Srihawan)
Authorized signatory

This certificate is issued the units of measurement according to the International System of Units (SI). It provides traceability of measurement to international or national standard or other recognized national standard laboratories.
The measurement uncertainty stated is the expanded uncertainty which is obtained from the standard uncertainty multiplied by the coverage factor (k=2) to provide a level of confidence of approximately 95%. It is determined in accordance with the Guide to Expression of Uncertainty in Measurement (GUM).
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CAL-FM-C08-08: 20 Jul 2022

ใบตรวจสอบสภาพเครื่องวัดสิ่งแขวนลอย

เลขที่ใบงาน: WO-00008310

ชนิดเครื่องมือ: TURBIDIMETER

รุ่น: 2100Q

หมายเลขเครื่อง: 14090C035505

Calibration Results:
Before Adjustment

Std Turbidity (NTU)	UUC Reading	Correction	Deviation	Uncertainty
0.080	0.20	-0.120	0.0	0.070
20.50	23.0	-2.50	0.1	1.0
103.0	109	-6.0	0.6	7.0
824.0	917	-93.0	0.8	45

After Adjustment

Std Turbidity (NTU)	UUC Reading	Correction	Deviation	Uncertainty
0.080	0.07	0.010	0.0	0.070
20.50	20.5	0.00	0.1	1.0
103.0	104	-1.0	0.5	7.0
824.0	823	1.0	0.7	45

The End of Certificate

ตรวจสอบ (รับ)		รายการตรวจสอบ	ตรวจสอบ (ส่ง)		หมายเหตุ
01 Nov 2023			01 Nov 2023		
ปกติ	ไม่ปกติ		ปกติ	ไม่ปกติ	
รายการตรวจสอบ					
General					
<input checked="" type="checkbox"/>	<input type="checkbox"/>	1. ความสมบูรณ์เครื่อง	<input checked="" type="checkbox"/>	<input type="checkbox"/>	
<input checked="" type="checkbox"/>	<input type="checkbox"/>	2. ความสะอาด (ช่องใส่ตัวอย่าง, ภายนอกเครื่อง)	<input checked="" type="checkbox"/>	<input type="checkbox"/>	
<input checked="" type="checkbox"/>	<input type="checkbox"/>	3. สวิทช์ เปิด – ปิด เครื่อง (On-Off Switch)	<input checked="" type="checkbox"/>	<input type="checkbox"/>	
<input checked="" type="checkbox"/>	<input type="checkbox"/>	4. แป้นกด (Keypad)	<input checked="" type="checkbox"/>	<input type="checkbox"/>	
<input checked="" type="checkbox"/>	<input type="checkbox"/>	5. หน้าจอ (Display, Screen Contrast)	<input checked="" type="checkbox"/>	<input type="checkbox"/>	
Spectrophotometer					
<input type="checkbox"/>	<input type="checkbox"/>	6. แรงดันไฟฟ้า (Battery Backup) >= 2.5 VDC	<input type="checkbox"/>	<input type="checkbox"/>	
<input type="checkbox"/>	<input type="checkbox"/>	7. ตัวหมุนเลือกความยาวคลื่น (Wavelength Control)	<input type="checkbox"/>	<input type="checkbox"/>	
<input type="checkbox"/>	<input type="checkbox"/>	8. ความยาวคลื่น (Wavelength Check)	<input type="checkbox"/>	<input type="checkbox"/>	
<input type="checkbox"/>	<input type="checkbox"/>	9. แหล่งกำเนิดแสง (UV < 3,000 hour)	<input type="checkbox"/>	<input type="checkbox"/>	
<input type="checkbox"/>	<input type="checkbox"/>	10. แหล่งกำเนิดแสง (Visible < 5,000 hour)	<input type="checkbox"/>	<input type="checkbox"/>	
<input type="checkbox"/>	<input type="checkbox"/>	11. ช่องจัดหลายตัวอย่าง (Carousel Module)	<input type="checkbox"/>	<input type="checkbox"/>	
pH Meter and Conductivity Meter					
<input type="checkbox"/>	<input type="checkbox"/>	12. อิเล็กโทรด (Electrode and Connection Cable)	<input type="checkbox"/>	<input type="checkbox"/>	
<input type="checkbox"/>	<input type="checkbox"/>	13. ระดับสารละลายใน Electrode (Level KCl)	<input type="checkbox"/>	<input type="checkbox"/>	
<input type="checkbox"/>	<input type="checkbox"/>	14. ฝาปิดกันปลาย Electrode (Dust Protection Hood)	<input type="checkbox"/>	<input type="checkbox"/>	
<input type="checkbox"/>	<input type="checkbox"/>	15. ขาจับอิเล็กโทรด (Stand)	<input type="checkbox"/>	<input type="checkbox"/>	
Turbidimeter					
<input checked="" type="checkbox"/>	<input type="checkbox"/>	16. ค่าความขุ่นที่ต่ำสุด (No Sample)	<input checked="" type="checkbox"/>	<input type="checkbox"/>	0.58/0.03 NTU
<input type="checkbox"/>	<input type="checkbox"/>	17. ระดับการส่องสว่างของแสง (≥ 2.5 ไม่น้อย 3.0)	<input type="checkbox"/>	<input type="checkbox"/>	
Automatic titrator					
<input type="checkbox"/>	<input type="checkbox"/>	18. สภาพ Piston Burettes	<input type="checkbox"/>	<input type="checkbox"/>	
<input type="checkbox"/>	<input type="checkbox"/>	19. Function Rinsing and Dosing	<input type="checkbox"/>	<input type="checkbox"/>	
<input type="checkbox"/>	<input type="checkbox"/>	20. ระบบท่อสายยางและอุปกรณ์ประกอบ	<input type="checkbox"/>	<input type="checkbox"/>	

เพิ่มเติม/ข้อแนะนำ :

Mr.Piyapat Saidoung
Service Engineer