

ใบตรวจสอบสภาพเครื่องควบคุมอุณหภูมิ

เลขที่ใบงาน: WO-00008310

ชนิดเครื่องมือ: Hot Air Oven
หมายเลขเครื่อง: B417.1014

รุ่น: UF110

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. การทำงาน พัดลม	<input checked="" type="checkbox"/>	<input type="checkbox"/>	
<input checked="" type="checkbox"/>	<input type="checkbox"/>	6. สภพ Lever of Ventilation valve	<input checked="" type="checkbox"/>	<input type="checkbox"/>	
<input checked="" type="checkbox"/>	<input type="checkbox"/>	7. สภพ Lever door open / close	<input checked="" type="checkbox"/>	<input type="checkbox"/>	
<input checked="" type="checkbox"/>	<input type="checkbox"/>	8. สภพ 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 type="checkbox"/>	<input type="checkbox"/>	10. การทำงานของระบบทำความเย็น	<input type="checkbox"/>	<input type="checkbox"/>	ไม่มี
<input type="checkbox"/>	<input type="checkbox"/>	11. การทำงานของระบบทำความร้อน	<input type="checkbox"/>	<input type="checkbox"/>	ไม่มี
<input checked="" type="checkbox"/>	<input type="checkbox"/>	12. สภพตัวเครื่อง	<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: Oven
Model: ED 115
Serial No.(or ID): 20190000012946
Manufacturer: Binder
Condition: In Condition
Shelves(pc.): 2

Certificate No.: C31232273
Issued Date: 09 November 2023
Job No.: WO-00008310
Page: 1 of 4
Ventilation Valve: Closed

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

Environment Condition: Temperature: 24 °C ± 0.9 °C
Humidity: 54 %RH ± 5.1 %RH
Voltage: 230 VAC ± 3.2 VAC

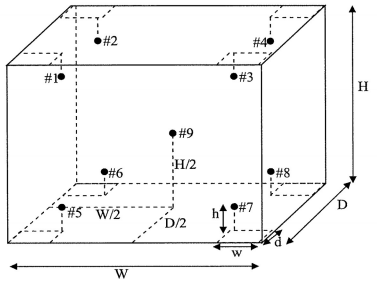
Calibration Place: Double A (1991) Public Company Limited. (Water Laboratory IP1)
1 Moo 2, Thatoom, Srimahaphot,
Prachinburi 25140 Thailand.

Calibration By: Mr. Suphanimit Khamnonphoem
Calibration Date: 01 November 2023
The Method used: In house method, 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.



Standard Installation Locations

Volume (Calibration Zone)= 62 (Liters)

Inside chamber: W = 60 (cm) D = 40 (cm) H = 53 (cm)

Standard Locations (#1, #2, #3, #4): w = 6 (cm) d = 5 (cm) h = 5 (cm)

Standard Locations (#5, #6, #7, #8): w = 6 (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	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.

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CAL-FM-C31-10: 12 Sep 2022

Calibration Results:

Before adjustment

Setting:	Indicating:	#1:	#2:	#3:	#4:	#5:	#6:	#7:	#8:	#9:
104	104	103.37	103.16	103.45	103.03	101.07	100.53	100.78	100.26	100.33

After adjustment

Measurement Temperature at Spread Locations, Indicating of Unit Under Calibration: 104 °C

Locations	Measured Temperature (°C)	Correction of UUC. (°C)	Uncertainty (± °C)
#1	105.80	1.80	0.79
#2	105.65	1.65	0.80
#3	105.85	1.85	0.79
#4	105.45	1.45	0.80
#5	104.19	0.19	0.80
#6	103.85	-0.15	0.80
#7	104.09	0.09	0.81
#8	103.91	-0.09	0.82
#9	104.03	0.03	0.82

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	104	104	105.80	105.65	105.85	105.45	104.19	103.85	104.09	103.91	104.03	0.82

Chamber Characterization

Indicating (°C)	Measured Uniformity (°C)	Measured Stability (± °C)	Overall Variation (°C)
104	1.94	0.17	2.19

Note: * Maximum uncertainty of the each position

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After adjustment (Cont.)

Measurement Temperature at Spread Locations, Indicating of Unit Under Calibration: 177 °C

Locations	Measured Temperature (°C)	Correction of UUC. (°C)	Uncertainty (± °C)
#1	180.97	3.97	0.83
#2	180.96	3.96	0.84
#3	180.99	3.99	0.84
#4	180.63	3.63	0.84
#5	180.12	3.12	0.85
#6	179.31	2.31	0.85
#7	179.84	2.84	0.87
#8	179.41	2.41	0.86
#9	178.94	1.94	0.86

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	177	177	180.97	180.96	180.99	180.63	180.12	179.31	179.84	179.41	178.94	0.87

Chamber Characterization

Indicating (°C)	Measured Uniformity (°C)	Measured Stability (± °C)	Overall Variation (°C)
177	2.20	0.25	2.34

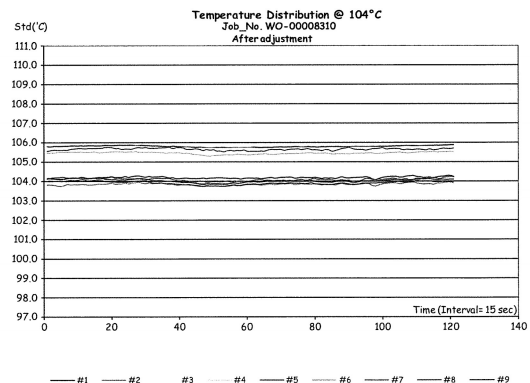
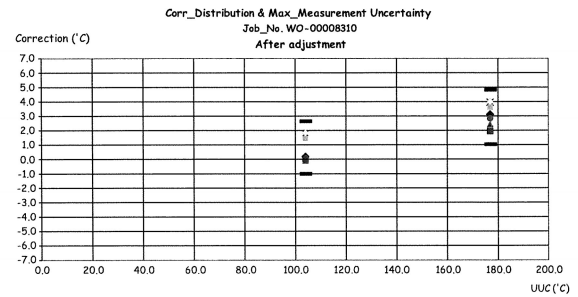
Note: * Maximum uncertainty of the each position

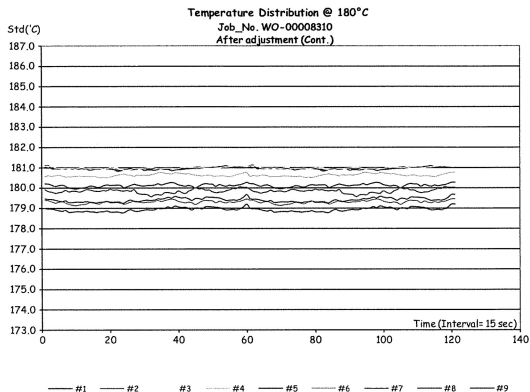
The End of Certificate

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CAL-FM-C31-10: 12 Sep 2022





ใบตรวจสอบสภาพเครื่องควบคุมอุณหภูมิ

ชนิดเครื่องมือ: Oven

รุ่น: ED 115

เลขที่ใบงาน: WO-00008310

หมายเลขเครื่อง: 20190000012946

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 type="checkbox"/>	<input type="checkbox"/>	5. การทำงาน ฟัดลม	<input type="checkbox"/>	<input type="checkbox"/>	ไม่มี
<input checked="" type="checkbox"/>	<input type="checkbox"/>	6. สภาพ Lever of Ventilation valve	<input checked="" type="checkbox"/>	<input type="checkbox"/>	
<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 type="checkbox"/>	<input type="checkbox"/>	10. การทำงานของระบบทำความเย็น	<input type="checkbox"/>	<input type="checkbox"/>	ไม่มี
<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"/>	

ขอแนะนำ :

Mr. Suphanimit Khamnonphoem
Service Engineer

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DKSH Technology Limited
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Certificate of Calibration

Certificate No.: C31232272 Page: 2 of 4

Equipment: Oven
Model: ED 115
Serial No.(or ID): 950360
Manufacturer: Binder
Condition: In Condition
Shelves(pc.): 2

Certificate No.: C31232272
Issued Date: 09 November 2023
Job No.: WO-00008310
Page: 1 of 4
Ventilation Valve: Closed

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

Environment Condition: Temperature: 24 °C ± 1.0 °C
Humidity: 54 %RH ± 5.1 %RH
Voltage: 230 VAC ± 3.2 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, 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

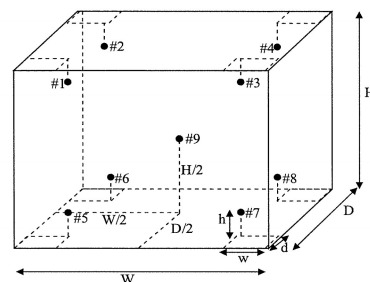
(Mr. Udon Srichana)
Authorized signatory

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CAL-FM-C31-10: 12 Sep 2022



Standard Installation Locations

Volume (Calibration Zone)= 22 (Liters)

Inside chamber: W = 60 (cm) D = 40 (cm) H = 48 (cm)

Standard Locations (#1, #2, #3, #4): w = 10 (cm) d = 10 (cm) h = 10 (cm)

Standard Locations (#5, #6, #7, #8): w = 10 (cm) d = 10 (cm) h = 10 (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

Calibration Results:

Before adjustment

Setting: Indicating: #1: #2: #3: #4: #5: #6: #7: #8: #9:
104 104 105.17 105.35 105.61 105.33 104.22 104.75 104.49 104.66 105.10

After adjustment

Measurement Temperature at Spread Locations, Indicating of Unit Under Calibration: 104 °C

Locations	Measured Temperature (°C)	Correction of UUC. (°C)	Uncertainty (± °C)
#1	103.97	-0.03	0.70
#2	104.11	0.11	0.71
#3	104.29	0.29	0.71
#4	104.06	0.06	0.71
#5	103.01	-0.99	0.71
#6	103.43	-0.57	0.77
#7	103.22	-0.78	0.72
#8	103.48	-0.52	0.77
#9	103.88	-0.12	0.73

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	104	104	103.97	104.11	104.29	104.06	103.01	103.43	103.22	103.48	103.88	0.77

Chamber Characterization

Indicating (°C)	Measured Uniformity (°C)	Measured Stability (± °C)	Overall Variation (°C)
104	1.04	0.30	1.53

Note: * Maximum uncertainty of the each position

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CAL-FM-C31-10: 12 Sep 2022

After adjustment (Cont.)

Measurement Temperature at Spread Locations, Indicating of Unit Under Calibration: 181 °C

Locations	Measured Temperature (°C)	Correction of UUC. (°C)	Uncertainty (± °C)
#1	179.71	-1.29	0.72
#2	180.55	-0.45	0.72
#3	180.27	-0.73	0.71
#4	180.36	-0.64	0.71
#5	179.16	-1.84	0.71
#6	179.74	-1.26	0.77
#7	179.26	-1.74	0.72
#8	180.47	-0.53	0.76
#9	180.05	-0.95	0.74

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	181	181	179.71	180.55	180.27	180.36	179.16	179.74	179.26	180.47	180.05	0.77

Chamber Characterization

Indicating (°C)	Measured Uniformity (°C)	Measured Stability (± °C)	Overall Variation (°C)
181	1.09	0.28	1.68

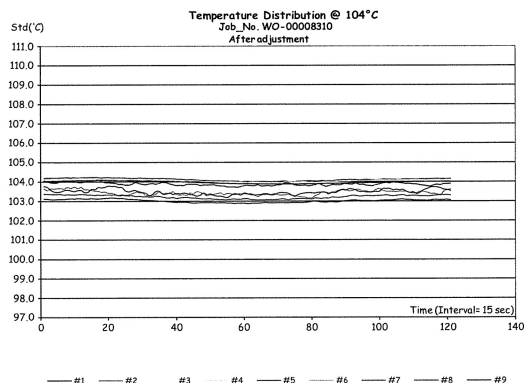
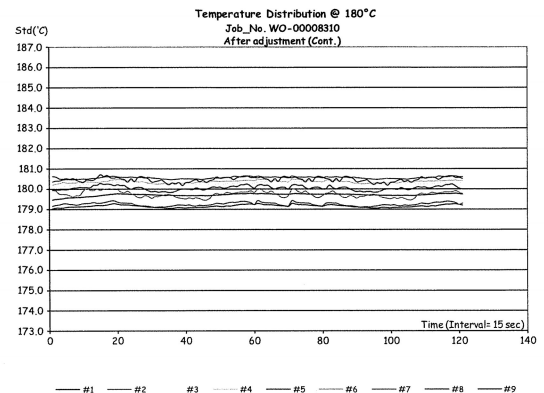
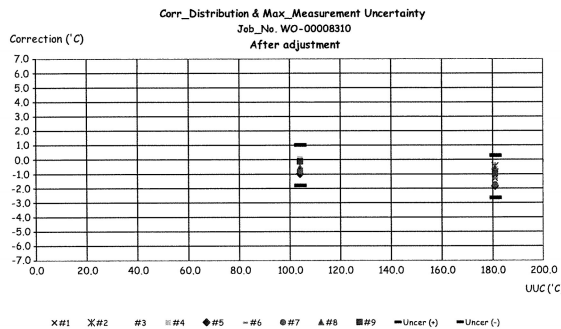
Note: * Maximum uncertainty of the each position

The End of Certificate

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ใบตรวจสอบสภาพเครื่องควบคุมอุณหภูมิ

เลขที่ใบงาน: WO-00008310

ชนิดเครื่อง: Oven
หมายเลขเครื่อง: 950360

รุ่น: ED 115

ตรวจสอบ (วัน)	รายการตรวจเช็ค		ตรวจสอบ (สิ่ง)		หมายเหตุ
			ปกติ	ไม่ปกติ	
01 Nov 2023	General				
ปกติ	ไม่ปกติ				
<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 type="checkbox"/>	<input type="checkbox"/>	5. การทำงาน พัดลม	<input type="checkbox"/>	<input type="checkbox"/>	ไม่มี
<input checked="" type="checkbox"/>	<input type="checkbox"/>	6. สภาพ Lever of Ventilation valve	<input checked="" type="checkbox"/>	<input type="checkbox"/>	
<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 type="checkbox"/>	<input type="checkbox"/>	10. การทำงานของระบบทำความเย็น	<input type="checkbox"/>	<input type="checkbox"/>	ไม่มี
<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. สภาวะแวดล้อม ณ สถานที่ตั้งเครื่อง	<input checked="" type="checkbox"/>	<input type="checkbox"/>	

ข้อแนะนำ:

Mr. Suphanimit Khamnonphoem
Service Engineer

บริษัท ดีเคเอสเอ เอเชีย (ไทยแลนด์) จำกัด
DKSH Technology Limited
2533 ถนนสุขุมวิท แขวงคลองเตย เขตคลองเตย กรุงเทพมหานคร 10260
2533 Sukhumvit Road, Bangkok, Prachinburi, Bangkok 10260
Phone: +66 2639 7000 Email: info.calibration@dksh.com Website: www.dksh.com/scientific-thailand

Delivering Growth - in Asia and Beyond.



Certificate of Calibration

Equipment: Liquid Bath
Model: WNB22/MAC5A
Serial No. (or ID.): L518.0690
Manufacturer: Memmert/SHIMAX
Condition: In Condition
Forced Circulation: None

Certificate No.: C13230363
Issued Date: 09 November 2023
Job No.: WO-00008310
Page: 1 of 3

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

Environment Condition: Temperature: 25 °C ± 0.5 °C
Humidity: 54 %RH ± 4.8 %RH
Voltage: 230 VAC ± 3.4 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: 02 November 2023

The Method used: In house method, CAL-WI-17, base on ASTM E715-80

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.

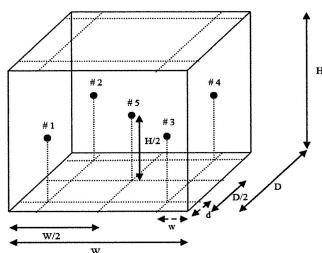
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CAL-FM-C13-13: 12 Sep 2022

Certificate No.: C13230363

Page: 2 of 3



Standard Installation Locations

Midway between the diffuser plate and the water surface

Inside bath: W = 36 (cm) D = 32 (cm) H = 24 (cm) Volume = 28 (Liters)

Standard Locations #1: w = 5 (cm) d = 5 (cm)

Standard Locations #2: w = 5 (cm) d = 5 (cm)

Standard Locations #3: w = 5 (cm) d = 5 (cm)

Standard Locations #4: w = 5 (cm) d = 5 (cm)

Standard Locations #5: Center of any probes. (#1 - #4)

Position of Std	#1	#2	#3	#4	#5
Channel of Logger	301	302	303	304	305

Definitions

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

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 bath at steady-state. The reference probe is preferably located in the geometric center of the bath.

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-C13-13: 12 Sep 2022

Certificate No.: C13230363

Page: 3 of 3

Calibration Results:

Without adjustment

Measurement Temperature at Spread Locations, Indicating of Unit Under Calibration: 85.0 °C

Locations	Measured Temperature (°C)	Correction of UUC. (°C)	Uncertainty (± °C)
#1	84.99	-0.01	0.33
#2	85.09	0.09	0.38
#3	84.91	-0.09	0.37
#4	84.84	-0.16	0.37
#5	84.88	-0.12	0.37

Temperature Distribution

Desired (°C)	Setting (°C)	Indicating (°C)	Measured Temperature at Spread Locations (°C)					Uncertainty (± °C)*
			#1	#2	#3	#4	#5	
85.0	85.0	85.0	84.99	85.09	84.91	84.84	84.88	0.38

Bath Characterization

Indicating (°C)	Measured Uniformity (°C)	Measured Stability (± °C)	Overall Variation (°C)
85.0	0.35	0.17	0.54

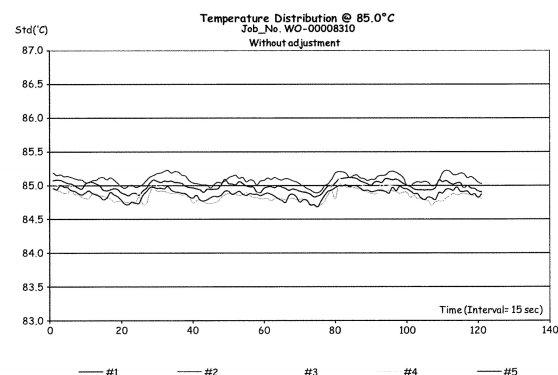
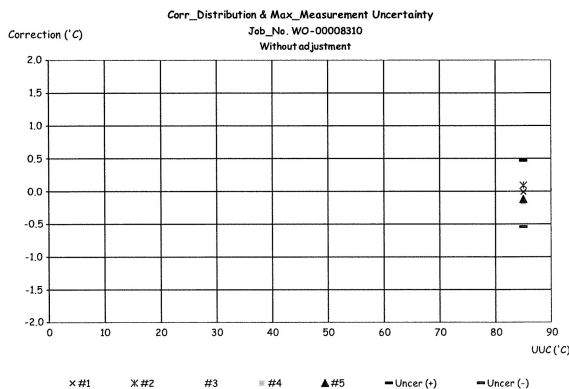
Note: * Maximum uncertainty of the each position

The End of Certificate

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CAL-FM-C13-13: 12 Sep 2022



ใบตรวจสอบสภาพเครื่องควบคุมอุณหภูมิ

เลขที่ใบงาน: WO-00008310

ชนิดเครื่องมือ: Liquid Bath

รุ่น: WNB22/MAC5A

หมายเลขเครื่อง: L518,0690

ตรวจสอบ (รับ)		รายการตรวจเช็ค	ตรวจสอบ (ส่ง)		หมายเหตุ
02 Nov 2023			02 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 type="checkbox"/>	<input type="checkbox"/>	5. การทำงาน Circulator	<input type="checkbox"/>	<input type="checkbox"/>	ไม่มี
<input type="checkbox"/>	<input type="checkbox"/>	6. สภาวะ Lever door open / close	<input type="checkbox"/>	<input type="checkbox"/>	ไม่มี
<input checked="" type="checkbox"/>	<input type="checkbox"/>	7. ท่อระบายน้ำทิ้ง (DRAIN)	<input checked="" type="checkbox"/>	<input type="checkbox"/>	
<input type="checkbox"/>	<input type="checkbox"/>	8. การทำงานของระบบทำความเย็น	<input type="checkbox"/>	<input type="checkbox"/>	ไม่มี
<input checked="" type="checkbox"/>	<input type="checkbox"/>	9. สภาพตัวเครื่อง	<input checked="" type="checkbox"/>	<input type="checkbox"/>	
<input checked="" type="checkbox"/>	<input type="checkbox"/>	10. สภาวะแวดล้อม ณ สถานที่ตั้งเครื่อง	<input checked="" type="checkbox"/>	<input type="checkbox"/>	

ข้อแนะนำ :

Mr. Suphanimit Khamnonphoem
Service Engineer

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DKSH Technology Limited
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Certificate of Calibration

Equipment: Liquid Bath
Model: WNB22/TCN4L
Serial No. (or ID.): L508.0973
Manufacturer: Memmert/Autronics
Condition: In Condition
Forced Circulation: None

Certificate No.: C13230362
Issued Date: 09 November 2023
Job No.: WO-00008310
Page: 1 of 3

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

Environment Condition: Temperature: 25 °C ± 1.1 °C
Humidity: 55 %RH ± 5.2 %RH
Voltage: 230 VAC ± 3.3 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-17, base on ASTM E715-80
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).
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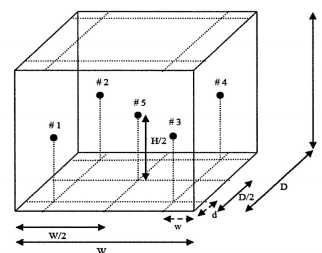
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CAL-FM-C13-13: 12 Sep 2022

Certificate No.: C13230362

Page: 2 of 3



Standard Installation Locations

Midway between the diffuser plate and the water surface

Inside bath: W = 36 (cm) D = 32 (cm) H = 24 (cm) Volume = 28 (Liters)

Standard Locations #1: w = 5 (cm) d = 5 (cm)

Standard Locations #2: w = 5 (cm) d = 5 (cm)

Standard Locations #3: w = 5 (cm) d = 5 (cm)

Standard Locations #4: w = 5 (cm) d = 5 (cm)

Standard Locations #5: Center of any probes. (#1 - #4)

Position of Std	#1	#2	#3	#4	#5
Channel of Logger	301	302	303	304	305

Definitions

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

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 bath at steady-state. The reference probe is preferably located in the geometric center of the bath.

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

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

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CAL-FM-C13-13: 12 Sep 2022

Calibration Results:

Before adjustment

Setting: Indicating: #1: #2: #3: #4: #5:
85 85 85.55 85.69 85.53 85.55 85.49

After adjustment

Measurement Temperature at Spread Locations, Indicating of Unit Under Calibration: 85 °C

Locations	Measured Temperature (°C)	Correction of UUC. (°C)	Uncertainty (± °C)
#1	84.62	-0.38	1.4
#2	84.76	-0.24	1.3
#3	84.60	-0.40	1.3
#4	84.62	-0.38	1.4
#5	84.56	-0.44	1.3

Temperature Distribution

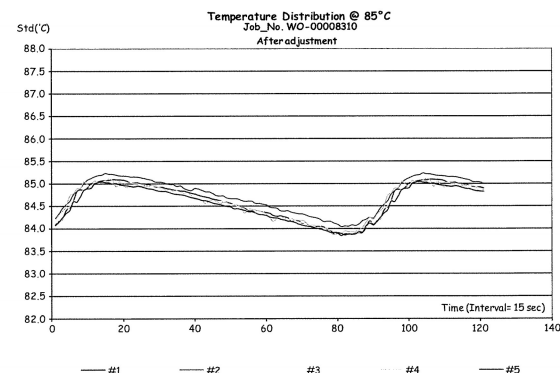
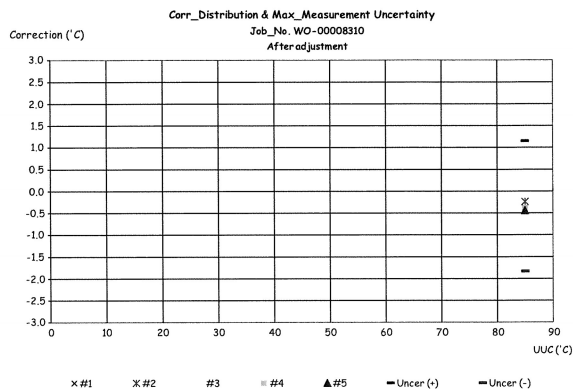
Desired (°C)	Setting (°C)	Indicating (°C)	Measured Temperature at Spread Locations (°C)					Uncertainty (± °C)*
#1	#2	#3	#4	#5				
85	85	85	84.62	84.76	84.60	84.62	84.56	1.4

Bath Characterization

Indicating (°C)	Measured Uniformity (°C)	Measured Stability (± °C)	Overall Variation (°C)
85	0.32	0.63	1.39

Note: * Maximum uncertainty of the each position

The End of Certificate



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CAL-FM-C13-13: 12 Sep 2022

ใบตรวจสอบสภาพเครื่องควบคุมอุณหภูมิ

เลขที่ใบงาน: WO-00008310

ชนิดเครื่องมือ: Liquid Bath

รุ่น: WNB22/TCN4L

หมายเลขเครื่อง: L508.0973

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 type="checkbox"/>	<input type="checkbox"/>	5. การทำงาน Circulator	<input type="checkbox"/>	<input type="checkbox"/>	ไม่มี
<input checked="" type="checkbox"/>	<input type="checkbox"/>	6. สภาวะ Lever door open / close	<input checked="" type="checkbox"/>	<input type="checkbox"/>	
<input checked="" type="checkbox"/>	<input type="checkbox"/>	7. ท่อระบายน้ำทิ้ง (DRAIN)	<input checked="" type="checkbox"/>	<input type="checkbox"/>	
<input type="checkbox"/>	<input type="checkbox"/>	8. การทำงานของระบบทำความเย็น	<input type="checkbox"/>	<input type="checkbox"/>	ไม่มี
<input checked="" type="checkbox"/>	<input type="checkbox"/>	9. สภาพตู้เครื่อง	<input checked="" type="checkbox"/>	<input type="checkbox"/>	
<input checked="" type="checkbox"/>	<input type="checkbox"/>	10. สภาวะแวดล้อม ณ สถานที่ตั้งเครื่อง	<input checked="" type="checkbox"/>	<input type="checkbox"/>	

ข้อแนะนำ :

Mr. Suphanimit Khamnonphoem
Service Engineer



Certificate of Calibration

Equipment: Cooled Incubator
Model: E50C
Serial No.(or ID): 03021
Manufacturer: OmRon
Condition: In Condition
Shelves(pc.): 9

Certificate No.: C31232275
Issued Date: 09 November 2023
Job No.: WO-00008310
Page: 1 of 3
Ventilation Valve: None

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

Environment Condition: Temperature: 24 °C ± 0.4 °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: 30 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

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CAL-FM-C31-10: 12 Sep 2022