



INTECH METROLOGICAL CENTER CO.,LTD.

CERTIFICATE No. : MC17-1618

PAGE : 2 OF 3

CERTIFICATE OF CALIBRATION:

ORDER No. : 136017	RECEIVED DATE : MAY 29, 2017	CALIBRATION DATE : MAY 29, 2017
DESCRIPTION : SPECTROPHOTOMETER		MANUFACTURER : HACH
MODEL : PR-5000	SERIAL No. : 1199185	IDENTIFICATION No. : WL-01008 MADE IN : N/A

CALIBRATION METHOD :

THIS INSTRUMENT WAS CALIBRATED BY DIRECT MATERIAL FOR WAVELENGTH ACCURACY , PHOTOMETRIC ACCURACY AND STAY LIGHT OF UV AND VISIBLE SPECTROPHOTOMETER USING CALIBRATION METHOD : CP - ELE - 011A BASE ON ASTM : E175-01 & 925-02

REFERENCE STANDARD :

DESCRIPTION	MODEL	SERIAL No.	CERTIFICATE No.	DUE DATE
STANDARD FOR PHOTOMETRIC	RM - IN2N3N	18944	45715	MAR 07, 2019

TRACEABILITY :

-THE MEASUREMENTS ARE TRACEABLE TO INTERNATIONAL SYSTEM OF UNITS (SI)
- NATIONAL INSTITUTE OF METROLOGY (THAILAND)



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CERTIFICATE No. : MC17-1618

PAGE : 3 OF 3

CERTIFICATE OF CALIBRATION:

ORDER No. : 136017	RECEIVED DATE : MAY 29, 2017	CALIBRATION DATE : MAY 29, 2017
DESCRIPTION : SPECTROPHOTOMETER		MANUFACTURER : HACH
MODEL : DR-5000	SERIAL No. : 1199185	IDENTIFICATION No. : WL-01008 MADE IN : N/A

RESULT OF CALIBRATION : WITHOUT ADJUSTMENT

FUNCTION : ABSORBANCE MEASUREMENT RESOLUTION : 0.001 Abs

WAVELENGTH (nm)	STANDARD ABSORBANCE	UUC* READING	UUC* CORRECTION	UNCERTAINTY OF MEASUREMENT(+/-)
440.0	0.0000	0.000	0.0000	0.005
	0.5587	0.561	-0.0023	0.005
	0.7510	0.754	-0.0030	0.006
	0.9917	0.997	-0.0053	0.006
465.0	0.0000	0.000	0.0000	0.005
	0.5195	0.521	-0.0015	0.005
	0.6905	0.696	-0.0055	0.006
	0.9417	0.946	-0.0043	0.006
546.1	0.0000	0.000	0.0000	0.005
	0.5163	0.517	-0.0007	0.005
	0.6986	0.704	-0.0054	0.006
	0.9853	0.989	-0.0037	0.006
590.0	0.0000	0.000	0.0000	0.005
	0.5490	0.549	0.0000	0.005
	0.7262	0.730	-0.0038	0.006
	1.0800	1.082	-0.0020	0.006
635.0	0.0000	0.000	0.0000	0.005
	0.5560	0.558	-0.0020	0.005
	0.6934	0.697	-0.0036	0.006
	1.0727	1.076	-0.0033	0.006

UUC - UNIT UNDER CALIBRATION

- END OF CERTIFICATE -

**IPV TEST CERTIFICATE MODEL
OPTIMA 7000DV**

ICP312791984

Customer : DARC Date Tested: 9-31.11.-17
 Recommendation Recertification
 Address : 122 Moo 2, Thatoom, 12 Months
Srimahaphote, 9-31.11.-18
Prachinburi 25140 13-31.11.-16
 User Name: ศุภวัชร ONE
 Phone: 085-8354510 02-719-6420 ext 204
 E-mail: thitaya_n@mibholding.com 02-319-7900

CONFIGURATION TESTED

MODEL OPTIMA 7000DV
 SERIAL NUMBER 080C0041302

TESTED EQUIPMENT
 IPV Methods

TEST STANDARD USED
 Mixed standard 1/10
 Mixed standard 1/100

CUSTOMER SUPPLIED
 2 % HNO3
 10 % HNO3

**ACCESSORIES/COMPONENT
NOT INCLUDED**

CALIBRATION NUMBER

EXPIRATION DATE

EXPIRATION DATE
 MAR 30, 2018
 JAN 30, 2018

CUSTOMER INITIALS

**IPV TEST CERTIFICATE MODEL
OPTIMA 7000DV**

ICP312791984

SERIAL NUMBER 080C0041302 DATE TESTED 9-31.11.-17

1. MECHANICAL CHECKS

- A. Inspect and clean all fans and filters. OK
- B. Inspect and replace as necessary, all torch components including the RF coil. OK
- C. Inspect all tubing for sign of clacking or leaking. OK
- D. Adjust water and gas pressure regulator settings. OK
- E. Inspect and leak check pneumatics drawers. OK
- F. Clean the exterior of the instrument. OK

2. OPTICAL CHECKS

- A. Inspect and clean all optical components. OK
- B. As required, check and replace all purgefilters. OK
- C. Recheck optical alignment. OK

3. COOLING SYSTEM CHECKS

- A. Perform preventive maintenance on chiller. OK
- B. Flush out the chiller every six months. OK

4. PERFORMANCE CHECKS

- A. Torch View Alignment. OK
- B. Wavelength Calibration. OK

**IPV TEST CERTIFICATE MODEL
OPTIMA 7000DV**

SERIAL NUMBER	080C0041302	DATE TESTED	9-๑1-๑๗-17
PARAMETER		SPECIFICATION	FINAL VAULE
Precision			
Zn 213.856	% RSD ≤ 1.0		0.87
Mg 280.260	% RSD ≤ 1.0		0.38
Mg 285.207	% RSD ≤ 1.0		0.45
Ba 455.403	% RSD ≤ 1.0		0.47
Detection Limits: Axial			
	Tl 190 nm, 3(sd) ≤ 10.0 ppb		0.05
	As 193 nm, 3(sd) ≤ 10.0 ppb		0.53
	Se 196 nm, 3(sd) ≤ 5.0 ppb		0.59
	Pb 220 nm, 3(sd) ≤ 3.0 ppb		0.11
	Mn 257 nm, ≤ 30 ppb		7.340
BEC: Axial			
Detection Limits: Radial			
	As 193 nm, 3(sd) ≤ 60.0 ppb		1.86
	Zn 213 nm, 3(sd) ≤ 2.0 ppb		0.06
	Mn 257 nm, 3(sd) ≤ 1.0 ppb		0.11
	La 379 nm, 3(sd) ≤ 3.0 ppb		0.29
	Ba 455 nm, 3(sd) ≤ 0.3 ppb		0.03
	Ba 493 nm, 3(sd) ≤ 0.6 ppb		0.05
	Mn 257 nm, ≤ 30 ppb		17.703
BEC: Radial			
Spectral Resolution: UV			
	As 193 nm, ≤ 0.009		0.00702
	Ni 231 nm, ≤ 0.011		0.00841
	Ni 341 nm, ≤ 0.015		0.01222
Spectral Resolution: VIS			
	Ba 455 nm, ≤ 0.020		0.01595

**IPV TEST CERTIFICATE MODEL
OPTIMA 7000DV**

SERIAL NUMBER 080C0041302 **DATE TESTED** 9-๑1-๑๗-17

Remarks :
Commissioning follow as commissioning performance sheets.

Calculate MnBEC = IB * STD Conc / IS-IB , where standard conc = 1000 ug/L

IB = Intensity of blank

IS = Intensity of Standard

Replace: B312-0305 Stepper Motor Slttr (170615)

Replace: B081-0584 Detector Board Assy (170615)


This is to certify that the above tests have been performed and the configuration tested

meets does not meet

the PerkinElmer Specifications listed on this certificate.

This certificate does not modify PerkinElmer's standard terms and condition of sale, including warranty terms.

Service Department PerkinElmer Ltd.

Authorized Representative:  (Krungchai Treevichien)
Customer Support Engineer



INCTECH METROLOGICAL CENTER CO.,LTD.

11/22 Soi Saimai 56/1, Saimai Rd., Kwang Saimai, Khat Saimai, Bangkok 10220

Tel.: (662) 909-8320-2 Fax.: (662) 909-8323

CERTIFICATE No. : MT17-4073

PAGE : 1 OF 2

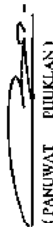
Certificate of Calibration

CUSTOMER : D.A.RESEARCH CENTER CO.,LTD.
 122 M2, T.THATUM, A.SRIMAHABODHI, PRACHINSURI 25140

DESCRIPTION : INCUBATOR
 MANUFACTURER : DILIGENT
 MODEL : N/A
 SERIAL No : 3021
 IDENTIFICATION No. : DARC-TE 12017
 MADE IN : N/A
 ENVIRONMENT : (25 +/- 10) °C (ON-SITE)
 (.50 +/- 30) %RH

CALIBRATION LOCATION : WATER LAB
 CALIBRATION DATE : MAY 29, 2017
 ISSUE DATE : JUN 07, 2017

CALIBRATED BY : IRATIPAN SREEBANNASARN

APPROVED BY :  (PANUWAT PITUKLAN)

MEASUREMENT UNCERTAINTY :

THE REPORTED UNCERTAINTY OF MEASUREMENT WAS BASED ON STANDARD UNCERTAINTY MULTIPLIED BY A COVERAGE FACTOR k = 2, WHICH EFFECTIVE DEGREE OF FREEDOM Veff > 100 CORRESPONDING TO A LEVEL OF CONFIDENCE OF APPROXIMATELY 95 %

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INCTECH METROLOGICAL CENTER CO.,LTD.

CERTIFICATE OF CALIBRATION
 ORDER No. : 136017 RECEIVED DATE : MAY 29, 2017 CALIBRATION DATE : MAY 29, 2017
 DESCRIPTION : INCUBATOR MANUFACTURER : DILIGENT
 MODEL : N/A SERIAL No. : 3021 IDENTIFICATION No. : DARC-TE 12017 MADE IN : N/A

CERTIFICATE No. : MT17-4073 PAGE : 2 OF 2

CALIBRATION METHOD :
 THE INSTRUMENT WAS CALIBRATED BY COMPARISON WITH LXI DATA ACQUISITION AND 20-CHANNEL MULTIPLEXER
 THE CALIBRATION WAS DONE IN ACCORDANCE WITH CP-TB-936A (CALIBRATION METHOD)
 THE TEMPERATURE SCALE WAS BASED ON DKD-85-7 GUIDELINES FOR CALIBRATION OF CLIMATIC CHAMBER.
 REFERENCE STANDARD :

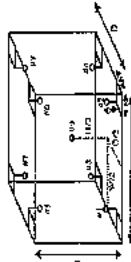
LXI DATA ACQUISITION SWITCH UNIT
 DESCRIPTION : MODEL : 34970A
 SERIAL No. : MY4-0001639
 CERTIFICATE No. : MT17-1063
 DUE DATE : JAN 08, 2018

TRACEABILITY :
 THE MEASUREMENT ARE TRACEABLE TO INTERNATIONAL SYSTEM OF UNIT (SI),
 THROUGH NATIONAL INSTITUTE OF METROLOGY (THAILAND)

RESULT OF CALIBRATION : WITHOUT ADJUSTMENT

CALIBRATION POINT : 20 °C RESOLUTION : 0.1 °C

FUNCTION : TEMPERATURE MEASUREMENT
 FRONT VIEW



Cal. point (°C)	#1	#2	#3	#4	#5	#6	#7	#8	#9	Uncertainty (± °C)
20	19.740	20.037	19.666	20.100	19.605	19.704	20.327	19.642	19.534	0.31

Setting	Indicating	Measured	Measured Overall
Temp (°C)	20.0	20.0	0.79
Temp Stability (± °C)	0.08	0.79	0.81
Temp Uniformity (°C)			
Temp Variation (°C)			

REMARK : UUC* = UNIT UNDER CALIBRATION



INTECH METROLOGICAL CENTER CO.,LTD.

11/22 Soi Saimai 56/1, Saimai Rd., Kwang Saimai, Khat Saimai, Bangkok 10220

Tel.: (662) 909-8820-2 Fax.: (662) 909-8323

CERTIFICATE No. : MIT7-4074

PAGE : 1 OF 2

Certificate of Calibration

CUSTOMER : D.A.RESEARCH CENTER CO.,LTD.
 122 M2, T.THATUM, A.SRINAKHABODHI, PRACHINBURU 25140

DESCRIPTION : HOT AIR OVEN

MANUFACTURER : WTB BINDER

MODEL : ED-115

SERIAL No : 950360

IDENTIFICATION No. : WL-022/03

MADE IN : GERMANY

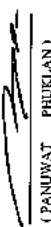
ENVIRONMENT : (25 +/- 10) °C (ON - SITE)
 (50 +/- 30) %RH

CALIBRATION LOCATION : WATER LAB

CALIBRATION DATE : MAY 29, 2017

ISSUE DATE : JUN 07, 2017

CALIBRATED BY : JIRAPHAN SREBANNASARN

APPROVED BY : 
 (PANUWAT PRUKSAN)

MEASUREMENT UNCERTAINTY :

THE REPORTED UNCERTAINTY OF MEASUREMENT WAS BASED ON STANDARD UNCERTAINTY MULTIPLIED BY A COVERAGE FACTOR $k = 2$, WHICH EFFECTIVE DEGREE OF FREEDOM $\nu_{eff} > 100$ CORRESPONDS A LEVEL OF CONFIDENCE OF APPROXIMATELY 95 %

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INTECH METROLOGICAL CENTER CO.,LTD.

CERTIFICATE No. : MIT7-4074
 PAGE : 2 OF 2

CERTIFICATE OF CALIBRATION

ORDER No. : 136017 RECEIVED DATE : MAY 29, 2017 CALIBRATION DATE : MAY 29, 2017

DESCRIPTION : HOT AIR OVEN MANUFACTURER : WTB BINDER

MODEL : ED-115 SERIAL No. : 950360 IDENTIFICATION No. : WL-022/03 MADE IN : GERMANY

CALIBRATION METHOD :

THE INSTRUMENT WAS CALIBRATED BY COMPARISON WITH LXI DATA ACQUISITION AND 20-CHANNEL MULTIPLEXER
 THE CALIBRATION WAS DONE IN ACCORDANCE WITH CP-TM-36A (CALIBRATION METHOD)
 THE TEMPERATURE SCALE WAS BASED ON OECD-RS-1 GUIDELINES FOR CALIBRATION OF CLIMATIC CHAMBER.

REFERENCE STANDARD :

LXI DATA ACQUISITION SWITCH UNIT MODEL : 34970A SERIAL No. : MY44003639 CERTIFICATE No. : MIT7-1083 DUE DATE : JAN 08, 2018

TRACEABILITY :

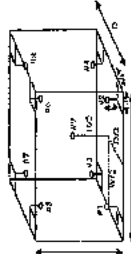
- THE MEASUREMENT ARE TRACEABLE TO INTERNATIONAL SYSTEM OF UNIT (SI),
 THROUGH NATIONAL INSTITUTE OF METROLOGY (THAILAND)

RESULT OF CALIBRATION : WITHOUT ADJUSTMENT

CALIBRATION POINT : 104 °C RESOLUTION : 1 °C

FUNCTION : TEMPERATURE MEASUREMENT

FRONT VIEW



Cal. point (°C)	Temperature of UUC* at each position (°C)									Uncertainty (± °C)
	#1	#2	#3	#4	#5	#6	#7	#8	#9	
104	103.348	103.456	103.580	104.24	104.273	104.273	104.032	103.786	103.786	0.64

Setting	Indicating	Measured	Measured	Overall
Temp (°C)	Temp (°C)	Stability (±°C)	Uniform (°C)	Variation (°C)
104	104	0.12	0.23	1.4

REMARK : UUC* = UNIT UNDER CALIBRATION

- END OF CERTIFICATE -

This report is certified only on the item calibrated.



INTECH METROLOGICAL CENTER CO.,LTD.

11/22 Soi Saimai 56/1, Saimai Rd., Kwang Saimai, Khat Saimai, Bangkok 10220

Tel.: (662) 909-8820-2 Fax.: (662) 909-8823

CERTIFICATE No. : INT17-4075

PAGE : 1 OF 2

Certificate of Calibration

CUSTOMER : D.A.RESEARCH CENTER CO.,LTD.
 122 M.2, T.THATUM, A.SRIMAHAABODHII, PRACHINBURI 25140

DESCRIPTION : HOT AIR OVEN

MANUFACTURER : MEMBERT

MODEL : UM200

SERIAL No : B297.0794

IDENTIFICATION No. : WL-023/03

MADE IN : GERMANY

ENVIRONMENT : (25 ± 0.1) °C (ON-SITE)
 (50 ± 0.30) %RH

CALIBRATION LOCATION : WATER LAB

CALIBRATION DATE : MAY 29, 2017

ISSUE DATE : JUN 07, 2017

CALIBRATED BY : IRAPHAN SREEBANNASARN

APPROVED BY :
(PANUWAT HUKLAN)

MEASUREMENT UNCERTAINTY :

THE REPORTED UNCERTAINTY OF MEASUREMENT WAS BASED ON STANDARD UNCERTAINTY MULTIPLIED BY A COVERAGE FACTOR $k = 2$, WHICH EFFECTIVE DEGREE OF FREEDOM $\nu_{eff} > 100$ CORRESPONDS A LEVEL OF CONFIDENCE OF APPROXIMATELY 95 %

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INTECH METROLOGICAL CENTER CO.,LTD.

CERTIFICATE No. : INT17-4075
PAGE : 2 OF 2

ORDER No. : 1360/17 RECEIVED DATE : MAY 29, 2017 CALIBRATION DATE : MAY 29, 2017

DESCRIPTION : HOT AIR OVEN MANUFACTURER : MEMBERT

MODEL : UM200 SERIAL No. : B297.0794 IDENTIFICATION No. : WL-023/03 MADE IN : GERMANY

CALIBRATION METHOD : THE INSTRUMENT WAS CALIBRATED BY COMPARISON WITH LXI DATA ACQUISITION AND 20-CHANNEL MULTIPLEXER. THE CALIBRATION WAS DONE IN ACCORDANCE WITH CP-TEM-36A (CALIBRATION METHOD) THE TEMPERATURE SCALE WAS BASED ON DKD-RS-7 GUIDELINES FOR CALIBRATION OF CLIMATIC CHAMBER

REFERENCE STANDARD : LXT DATA ACQUISITION SWITCH UNIT MODEL : 34970A SRV No. : MY44003639 CERTIFICATE No. : INT17-1053 DUE DATE : JAN 08, 2018

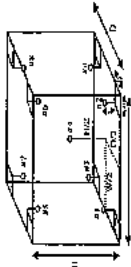
TRACEABILITY : THE MEASUREMENT ARE TRACEABLE TO INTERNATIONAL SYSTEM OF UNIT (SI), THROUGH NATIONAL INSTITUTE OF METROLOGY (THAILAND)

RESULT OF CALIBRATION : WITHOUT ADJUSTMENT

CALIBRATION POINT : 104 °C RESOLUTION : 1 °C

FUNCTION : TEMPERATURE MEASUREMENT

FRONT VIEW



Cal. point	Temperature of UUC* at each position (°C)									Uncertainty
104	#1	#2	#3	#4	#5	#6	#7	#8	#9	(\pm °C)
	102.436	102.600	103.111	103.786	103.318	103.473	104.263	104.890	104.244	0.78

Setting	Indicating Temp (°C)	Measured Temp (°C)	Stability (°C)	Uniformity (°C)	Overall Variation (°C)
104	104	104	0.15	2.0	2.5

REMARK : UUC* = UNIT UNDER CALIBRATION

- END OF CERTIFICATE -