



THE AMERICAN ASSOCIATION FOR  
LABORATORY ACCREDITATION

## ACCREDITED LABORATORY

A2LA has accredited

### MICRO PRECISION CALIBRATION CO., LTD. - THAILAND DIVISION

for technical competence in the field of

#### Calibration

This laboratory is accredited in accordance with the recognized International Standard ISO/IEC 17025:2005 *General Requirements for the Competence of Testing and Calibration Laboratories*. This laboratory also meets the requirements of ANSI/NCSL Z540-1-1994 and any additional program requirements in the field of calibration. This accreditation demonstrates technical competence for a defined scope and the operation of a laboratory quality management system (*refer to joint ISO-ILAC-IAF Communiqué dated 18 June 2005*).

Presented this 19<sup>th</sup> day of February 2008.

A handwritten signature in black ink, reading "Peter Abney".

President  
For the Accreditation Council  
Certificate Number 935.06  
Valid to January 31, 2009



For the calibrations to which this accreditation applies, please refer to the laboratory's Calibration Scope of Accreditation.

SCOPE OF ACCREDITATION TO ISO/IEC 17025:2005  
& ANSI/NCSL Z540-1-1994

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CALIBRATION

Valid To: January 31, 2009

Certificate Number: 935.06

In recognition of the successful completion of the A2LA evaluation process, accreditation is granted to this laboratory to perform the following calibrations<sup>1</sup>:

I. Electrical – DC & Low Frequency<sup>3</sup>

Parameter/Equipment	Range	Best Uncertainty <sup>2,3</sup> (±)	Comments
DC Voltage – Generate	(0 to 220) mV 220 mV to 2.2 V (2.2 to 11) V (11 to 22) V (22 to 220) V (220 to 1100) V	11 $\mu\text{V/V} + 0.6 \mu\text{V}$ 10 $\mu\text{V/V} + 1.0 \mu\text{V}$ 11 $\mu\text{V/V} + 3.5 \mu\text{V}$ 10 $\mu\text{V/V} + 6.5 \mu\text{V}$ 11 $\mu\text{V/V} + 80 \mu\text{V}$ 13 $\mu\text{V/V} + 500 \mu\text{V}$	Fluke 5700A
DC Voltage – Measure	(0 to 100) mV 100 mV to 1V (1 to 10) V (10 to 100) V (100 to 1000) V	13 $\mu\text{V/V} + 3.0 \mu\text{V}$ 17 $\mu\text{V/V} + 0.3 \mu\text{V}$ 13 $\mu\text{V/V} + 0.05 \mu\text{V}$ 15 $\mu\text{V/V} + 0.3 \mu\text{V}$ 15 $\mu\text{V/V} + 0.1 \mu\text{V}$	HP 3458A
DC Current – Generate	(0 to 220) $\mu\text{A}$ 220 $\mu\text{A}$ to 22 mA (22 to 220) mA 220 mA to 2.2 A (2.2 to 11) A	50 $\mu\text{A/A} + 8 \text{ nA}$ 50 $\mu\text{A/A} + 8 \text{ nA}$ 50 $\mu\text{A/A} + 80 \text{ nA}$ 60 $\mu\text{A/A} + 0.8 \mu\text{A}$ 80 $\mu\text{A/A} + 25 \mu\text{A}$	Fluke 5700A

Parameter/Equipment	Range	Best Uncertainty <sup>2,3</sup> ( $\pm$ )	Comments
DC Current <sup>6</sup> – Measure	Up to 100 nA 100 nA to 1 $\mu$ A (1 to 10) $\mu$ A (10 to 100) $\mu$ A 100 $\mu$ A to 10 mA (10 to 100) mA 100 mA to 1 A	35 $\mu$ A/A + 400 $\mu$ A 25 $\mu$ A/A + 40 $\mu$ A 25 $\mu$ A/A + 10 $\mu$ A 25 $\mu$ A/A + 5 $\mu$ A 25 $\mu$ A/A + 5 $\mu$ A 40 $\mu$ A/A + 5 $\mu$ A 0.012 % + 10 $\mu$ A	HP 3458A
Resistance <sup>5</sup> – Generate  Fixed Points	1 $\Omega$ 10 $\Omega$ 100 $\Omega$ 1 k $\Omega$ 10 k $\Omega$ 100 k $\Omega$ 1 M $\Omega$ 10 M $\Omega$ 100 M $\Omega$	0.013 % 39 parts in 10 <sup>6</sup> 24 parts in 10 <sup>6</sup> 18 parts in 10 <sup>6</sup> 17 parts in 10 <sup>6</sup> 19 parts in 10 <sup>6</sup> 27 parts in 10 <sup>6</sup> 54 parts in 10 <sup>6</sup> 0.016 %	Fluke 5700A
Resistance <sup>6</sup> – Measure	(0 to 10) $\Omega$ (10 to 100) $\Omega$ 100 $\Omega$ to 100 k $\Omega$ 100 k $\Omega$ to 1 M $\Omega$ (1 to 10) M $\Omega$ (10 to 100) M $\Omega$ 100 M $\Omega$ to 1 G $\Omega$	19 parts in 10 <sup>6</sup> + 0.06 m $\Omega$ 13 parts in 10 <sup>6</sup> + 0.6 m $\Omega$ 10 parts in 10 <sup>6</sup> + 0.6 m $\Omega$ 15 parts in 10 <sup>6</sup> + 2.4 m $\Omega$ 59 parts in 10 <sup>6</sup> + 120 $\Omega$ 0.058 % + 1200 $\Omega$ 1.8 % + 10 k $\Omega$	HP 3458A

Parameter/Range	Frequency	Best Uncertainty <sup>2,3</sup> ( $\pm$ )	Comments
AC Voltage <sup>5</sup> – Generate  (0 to 220) mV	(10 to 20) Hz (20 to 40) Hz 40 Hz to 20 kHz (20 to 50) kHz (50 to 100) kHz 100 kHz to 1 MHz	0.055 % + 13 $\mu$ V 0.021 % + 8 $\mu$ V 0.011 % + 8 $\mu$ V 0.037 % + 8 $\mu$ V 0.085 % + 25 $\mu$ V 0.34 % + 80 $\mu$ V	Fluke 5700A

Parameter/Range	Frequency	Best Uncertainty <sup>2</sup> (±)	Comments
AC Voltage <sup>3</sup> (cont.) – Generate			
220 mV to 2.2 V	(10 to 20) Hz (20 to 40) Hz 40 Hz to 20 kHz (20 to 50) kHz (50 to 100) kHz 100 kHz to 1 MHz	0.05 % + 80 μV 0.016 % + 25 μV 75 μV/V + 6 μV 0.012 % + 16 μV 0.025 % + 70 μV 0.22 % + 850 μV	Fluke 5700A
(2.2 to 22) V	(10 to 20) Hz (20 to 40) Hz 40 Hz to 20 kHz (20 to 50) kHz (50 to 100) kHz 100 kHz to 1 MHz	0.05 % + 0.8 mV 0.016 % + 0.25 mV 75 μV/V + 0.06 mV 0.012 % + 0.16 mV 0.025 % + 0.35 mV 0.34 % + 8.5 mV	
(22 to 220) V	(10 to 20) Hz (20 to 40) Hz 40 Hz to 20 kHz (20 to 50) kHz (50 to 100) kHz 100 kHz to 1 MHz	0.05 % + 0.8 mV 0.016 % + 0.25 mV 80 μV/V + 0.06 mV 0.022 % + 0.16 mV 0.05 % + 0.35 mV 0.27 % + 8.5 mV	
(220 to 750) V	(30 to 50) kHz (50 to 100) kHz	0.06 % + 11 mV 0.23 % + 45 mV	
(220 to 1100) V	(15 to 50) Hz 50 Hz to 1 kHz	0.04 % + 16 mV 90 μV/V + 4 MV	
AC Voltage <sup>6</sup> – Measure			
Up to 10 mV	(1 to 40) Hz 40 Hz to 1 kHz (1 to 20) kHz (20 to 50) kHz (50 to 100) kHz (100 to 300) kHz	0.03 % + 3 μV 0.02 % + 2 μV 0.03 % + 2 μV 0.12 % + 2 μV 0.58 % + 2 μV 4.6 % + 2 μV	HP 3458A
10 mV to 10 V	(1 to 40) Hz 40 Hz to 1 kHz (1 to 20) kHz (20 to 50) kHz (50 to 100) kHz (100 to 300) kHz 300 kHz to 1 MHz (1 to 2) MHz	80 μV/V + 0.4 mV 80 μV/V + 0.2 mV 0.02 % + 0.2 mV 0.03 % + 0.2 mV 0.09 % + 0.2 mV 0.35 % + 2 mV 1.2 % + 1 mV 1.7 % + 2 mV	

Parameter/Range	Frequency	Best Uncertainty <sup>2</sup> (±)	Comments
AC Voltage <sup>6</sup> – Measure			
(10 to 100) V	(1 to 40) Hz 40 Hz to 1 kHz (20 to 50) kHz (50 to 100) kHz (100 to 300) kHz 300 kHz to 1 MHz	0.02 % + 4 mV 0.02 % + 2 mV 0.04 % + 2 mV 0.14 % + 2 mV 0.46 % + 10 mV 1.7 % + 10 mV	HP 3458A
(100 to 1000) V	(1 to 40) Hz 40 Hz to 1 kHz (1 to 20) kHz (20 to 50) kHz (50 to 100) kHz	0.05 % + 40 mV 0.05 % + 20 mV 0.07 % + 20 mV 0.14 % + 20 mV 0.35 % + 20 mV	
AC Voltage <sup>5</sup> – Measure			
2.2 mV	(10 to 20) Hz (20 to 40 Hz) 40 Hz to 20 kHz (20 to 50) kHz (50 to 100) kHz (100 to 300) kHz (300 to 500) kHz 500 kHz to 1 MHz	0.17 % + 1.3 μV 0.071 % + 1.3 μV 0.042 % + 1.3 μV 0.079 % + 2.0 μV 0.012 % + 2.5 μV 0.023 % + 4.0 μV 0.024 % + 8.0 μV 0.35 % + 8.0 μV	Fluke 5790A
7.0 mV	(10 to 20) Hz (20 to 40 Hz) 40 Hz to 20 kHz (20 to 50) kHz (50 to 100) kHz	0.086 % + 1.3 μV 0.038 % + 1.3 μV 0.024 % + 1.3 μV 0.046 % + 2.0 μV 0.065 % + 2.5 μV	
7.0 mV	(100 to 300) kHz (300 to 500) kHz 500 kHz to 1 MHz  (10 to 20) Hz (20 to 40 Hz) 40 Hz to 20 kHz (20 to 50) kHz (50 to 100) kHz	0.13 % + 4.0 μV 0.15 % + 8.0 μV 0.24 % + 8.0 μV  0.033 % + 1.3 μV 0.021 % + 1.3 μV 0.012 % + 1.3 μV 0.023 % + 2.0 μV 0.035 % + 2.5 μV	

Parameter/Range	Frequency	Best Uncertainty <sup>2</sup> (±)	Comments
AC Voltage <sup>5</sup> (cont.) – Measure			
22 mV	(100 to 300) kHz (300 to 500) kHz 500 kHz to 1 MHz	0.082 % + 4.0 μV 0.097 % + 8.0 μV 0.19 % + 8.0 μV	Fluke 5790A
70 mV	(9.5 to 10) Hz	0.099 % + 1.8 μV	
	(10 to 20) Hz	0.029 % + 1.8 μV	
	(20 to 40 Hz)	0.013 % + 1.8 μV	
	40 Hz to 20 kHz	0.0071 % + 1.8 μV	
	(20 to 50) kHz	0.016 % + 2.9 μV	
220 mV	(50 to 100) kHz	0.031 % + 4.8 μV	
	(100 to 300) kHz	0.056 % + 6.4 μV	
	(300 to 500) kHz	0.080 % + 9.5 μV	
	500 kHz to 1 MHz	0.13 % + 9.5 μV	
	(9.5 to 10) Hz	0.098 % + 1.8 μV	
700 mV	(10 to 20) Hz	0.025 % + 1.8 μV	
	(20 to 40 Hz)	0.0092 % + 1.8 μV	
	40 Hz to 20 kHz	0.0046 % + 1.8 μV	
	(20 to 50) kHz	0.011 % + 2.9 μV	
	(50 to 100) kHz	0.024 % + 4.8 μV	
2.2 V	(100 to 300) kHz	0.035 % + 6.4 μV	
	(300 to 500) kHz	0.060 % + 9.5 μV	
	500 kHz to 1 MHz	0.12 % μV	
	(9.5 to 10) Hz	0.091 % + 11 μV	
	(10 to 20) Hz	0.024 % + 11 μV	
	(20 to 40 Hz)	0.0082 % + 5.3 μV	
	40 Hz to 20 kHz	0.0042 % + 1.9 μV	
	(20 to 50) kHz	0.057 % + 2.9 μV	
	(50 to 100) kHz	0.011 % + 4.8 μV	
	(100 to 300) kHz	0.022 % + 16 μV	
	(300 to 500) kHz	0.038 % + 41 μV	
	500 kHz to 1 MHz	0.12 % + 0.11 mV	
	(9.5 to 10) Hz	0.098 % + 10 μV	
	(10 to 20) Hz	0.024 % + 10 μV	
	(20 to 40 Hz)	0.0078 % + 5.0 μV	
40 Hz to 20 kHz	0.0032 % + 1.0 μV		
(20 to 50) kHz	0.0055 % + 2.0 μV		
(50 to 100) kHz	0.010 % + 4.0 μV		
(100 to 300) kHz	0.020 % + 15 μV		
(300 to 500) kHz	0.036 % + 40 μV		
500 kHz to 1 MHz	0.11 % + 0.10 mV		

Parameter/Range	Frequency	Best Uncertainty <sup>2</sup> (±)	Comments
AC Voltage <sup>5</sup> (cont.) – Measure			
7.0 V	(9.5 to 10) Hz (10 to 20) Hz (20 to 40 Hz) 40 Hz to 20 kHz (20 to 50) kHz (50 to 100) kHz (100 to 300) kHz (300 to 500) kHz 500 kHz to 1 MHz	0.098 % + 0.10 mV 0.024 % + 0.10 mV 0.0078 % + 0.03 mV 0.0032 % + 0.01 mV 0.0056 % + 0.02 mV 0.011 % + 0.04 mV 0.025 % + 0.15 mV 0.048 % + 0.30 mV 0.13 % + 0.50 mV	Fluke 5790A
22 V	(9.5 to 10) Hz (10 to 20) Hz (20 to 40 Hz) 40 Hz to 20 kHz (20 to 50) kHz (50 to 100) kHz (100 to 300) kHz (300 to 500) kHz 500 kHz to 1 MHz	0.098 % + 0.10 mV 0.024 % + 0.10 mV 0.0078 % + 0.03 mV 0.0033 % + 0.01 mV 0.0056 % + 0.02 mV 0.011 % + 0.04 mV 0.024 % + 0.15 mV 0.048 % + 0.30 mV 0.13 % + 0.50 mV	
70 V	(9.5 to 10) Hz (10 to 20) Hz (20 to 40 Hz) 40 Hz to 20 kHz (20 to 50) kHz (50 to 100) kHz (100 to 300) kHz (300 to 500) kHz 500 kHz to 1 MHz	0.098 % + 1.0 mV 0.024 % + 1.0 mV 0.0078 % + 0.30 mV 0.0041 % + 0.08 mV 0.0081 % + 0.10 mV 0.015 % + 0.50 mV 0.032 % + 0.60 mV 0.062 % + 0.80 mV 0.17 % + 1.0 mV	
220 V	(10 to 20) Hz (20 to 40 Hz) 40 Hz to 20 kHz (20 to 50) kHz (50 to 100) kHz (100 to 300) kHz (300 to 500) kHz	0.023 % + 1.0 mV 0.0078 % + 0.30 mV 0.0041 % + 0.08 mV 0.0090 % + 0.10 mV 0.016 % + 0.50 mV 0.033 % + 0.60 mV 0.069 % + 0.80 mV	
700 V	(10 to 20) Hz (20 to 40 Hz) 40 Hz to 20 kHz (20 to 50) kHz (50 to 100) kHz	0.022 % 0.014 % 0.0099 % 0.046 % 0.21 %	

Parameter/Range	Frequency	Best Uncertainty <sup>2</sup> (±)	Comments
AC Voltage <sup>5</sup> (cont.) – Measure  1000 V	(10 to 20) Hz (20 to 40 Hz) 40 Hz to 20 kHz (20 to 50) kHz (50 to 100) kHz	0.023 % 0.014 % 0.0099 % 0.046 % 0.21 %	Fluke 5790A
AC Resistance <sup>3</sup> – Measure  1 Ω to 1 MΩ	12 Hz to 100 kHz	0.091 % of reading	Genrad 1689-6500
AC Current <sup>3,5</sup> – Generate  (1 to 220) μA 220 μA to 22 mA (22 to 220) mA 220 mA to 2.2 A	40 Hz to 1 kHz	0.09 % 0.024 % 0.026 % 0.093 %	Fluke 5700A
AC Current <sup>3,6</sup> – Measure  Up to 100 μA  100 μA to 100 mA  100 mA to 1 A	(10 to 20) Hz (20 to 45) Hz 45 Hz to 1 kHz  (10 to 20) Hz (20 to 45) Hz (45 to 100) Hz 100 Hz to 5 kHz  (10 to 20) Hz (20 to 45) Hz (45 to 100) Hz 100 Hz to 5 Hz	0.46 % + 0.03 μA 0.18 % + 0.03 μA 0.078 % + 0.03 μA  0.46 % + 20 μA 0.17 % + 20 μA 0.073 % + 20 μA 0.042 % + 20 μA  0.46 % + 200 μA 0.19 % + 200 μA 0.10 % + 200 μA 0.12 % + 200 μA	HP 3458A

Parameter	Range	Best Uncertainty <sup>2,3</sup> (±)	Comments
Electrical Calibration of Thermocouple Indicators <sup>3</sup> –			
Type E	(-250 to -100) °C (-100 to 650) °C (650 to 1000) °C	0.56 °C 0.54 °C 0.53 °C	Fluke 5500A
Type J	(-210 to -100) °C (-100 to 760) °C (760 to 1200) °C	0.52 °C 0.51 °C 0.45 °C	
Type K	(-200 to -100) °C (-100 to 120) °C (120 to 1000) °C (1000 to 1372) °C	0.43 °C 0.48 °C 0.46 °C 0.46 °C	
Type S	(0 to 250) °C (250 to 1400) °C (1400 to 1767) °C	0.45 °C 0.47 °C 0.55 °C	
Type T	(-250 to -150) °C (-150 to 0) °C (0 to 400) °C	0.58 °C 0.59 °C 0.53 °C	
Electrical Calibration of RTD's <sup>3</sup> –			
Pt 395, 100 Ω	(-200 to 0) °C (0 to 100) °C (100 to 400) °C (400 to 630) °C (630 to 800) °C	0.05 °C 0.07 °C 0.10 °C 0.12 °C 0.23 °C	Fluke 5500A
Pt 3926, 100 Ω	(-200 to 0) °C (0 to 100) °C (100 to 400) °C (400 to 630) °C	0.05 °C 0.07 °C 0.10 °C 0.12 °C	
Pt 3916, 100 Ω	(-200 to -190) °C (-190 to 0) °C (0 to 300) °C (300 to 600) °C (600 to 630) °C	0.25 °C 0.05 °C 0.08 °C 0.10 °C 0.23 °C	

Parameter	Range	Best Uncertainty <sup>2</sup> (±)	Comments
Electrical Calibration of RTD's <sup>3</sup> (cont.) –			
Pt 385, 200 Ω	(-200 to 100) °C (100 to 260) °C (260 to 600) °C (600 to 630) °C	0.04 °C 0.05 °C 0.14 °C 0.16 °C	Fluke 5500A
Pt 385, 500 Ω	(-200 to 100) °C (100 to 260) °C (260 to 600) °C (600 to 630) °C	0.05 °C 0.06 °C 0.09 °C 0.11 °C	
Pt 385, 1 kΩ	(-200 to 100) °C (100 to 260) °C (260 to 600) °C (600 to 630) °C	0.03 °C 0.05 °C 0.07 °C 0.23 °C	
PtNi 385, 100 Ω	(-80 to 100) °C (100 to 260) °C	0.08 °C 0.14 °C	
Cu 427, 10 Ω	(-100 to 260) °C	0.3 °C	
Inductance <sup>3</sup> – Measure and Generate	100 μH to 10 H	0.12 %	Genrad 1689-6500
Fixed Values	1.0 mH 10 mH 100 mH 1 H	0.054 % IV 0.065 % IV 0.059 % IV 0.075 % IV	Genrad 1482E Genrad 1482H Genrad 1482L Genrad 1482P
Capacitance <sup>3</sup> – Generate @ 1 kHz	(0.33 to 0.49) nF (0.50 to 1.09) nF (1.10 to 3.29) nF (3.30 to 10.9) nF (11.0 to 32.9) nF (33 to 109.9) μF (110 to 329.9) μF (0.33 to 1.09) mF (1.10 to 3.29) mF	3.3 % 1.4 % 0.73 % 0.51 % 0.54 % 0.32 % 0.32 % 0.29 % 0.37 %	Fluke 5500A
Capacitance <sup>3</sup> – Measure	1 uf to 1 mf	0.10 % IV	Genrad 1689-6500

II. Electrical – RF/Microwave

Parameter/Range	Frequency	Best Uncertainty <sup>2</sup> (±)	Comments
RF Tuned Power <sup>3</sup> – (0 to -100) dB	Up to 1.3 GHz  2.5 MHz to 26.5 GHz	0.04 dB  0.72 dB	HP 8902A w/HP11722A  HP 11793A, HP 11792A
RF Absolute Power <sup>3</sup> – Generate  (Connector Type N)	50 MHz to 50 GHz	0.64 dB 0.06 dB 0.068 dB 1.2 % IV	HP 438B, 8484A, 8481A, 8487A
Amplitude Modulation <sup>3</sup> – Measure  Rate: 150 kHz to 10 MHz Depth: (5 to 99) %  Rate: 10 MHz to 1.3 GHz Depth: (5 to 99) %	50 Hz to 10 kHz 20 Hz to 10 kHz  50 Hz to 10 kHz 20 Hz to 10 kHz	4 % IV 4.6 % IV  3.6 % IV 4.6 % IV	HP 8902A
Frequency Modulation <sup>3</sup> – Measure  Rate: 250 kHz to 10 MHz Dev: ≤ 40 kHz  Rate: 10 MHz to 1.3 GHz Dev: ≤ 400 kHz	50 Hz to 10 kHz  50 Hz to 100 kHz 20 Hz to 200 kHz	3.1 % IV  7.7 % IV 1.6 % IV	HP 8902A
Phase Modulation <sup>3</sup> –  Rate: 10 MHz to 1.3 GHz	200 Hz to 20 kHz	7 % IV	HP 8902A

### III. Time & Frequency

Parameter/Range	Frequency	Best Uncertainty <sup>2,3</sup> ( $\pm$ )	Comments
Frequency – Measuring Equipment	1 MHz 10 MHz	$5 \times 10^{-12}$ $5 \times 10^{-12}$	HP 58503A, GPS

### IV. Thermodynamics

Parameter/Equipment	Range	Best Uncertainty <sup>2,3</sup> ( $\pm$ )	Comments
Humidity – Measuring Equipment	11 % RH 33 % RH 70 % RH 97 % RH	1.6 % RH 1.7 % RH 1.4 % RH 2.0 % RH	Saturated salt solutions
Temperature – Measure	(-40 to 300) °C	0.2 °C	Rosemont 162C

### V. Optical Quantities

Parameter/Equipment	Range	Best Uncertainty <sup>2,3</sup> ( $\pm$ )	Comments
Optical Power – Measure			
850 nm	(6 to -60) dB	4.9 % of reading	Agilent 81654, 81533B, 8156A, 81532, 81551MM
1310 nm	(10 to -110) dB	4.9 % of reading	
1550 nm	(10 to -110) dB	4.7 % of reading	
Optical Wavelength – Measure	(700 to 1650) nm	3.9 % of reading	Agilent 86120A
Fiber Optics Wavelength – Measuring Equipment	(1510 to 1540) nm	1.5 parts in $10^6$	NIST SRM 2517A

VI. Dimensional

Parameter/Equipment	Range	Best Uncertainty <sup>2,3,4</sup> ( $\pm$ )	Comments
Calipers & Height Gages	(0.10 to 12) in	$(120 + 5L) \mu\text{in}$	Gage blocks
Micrometers – Outside, Inside, Depth (Length only)  Resolution: 100 $\mu\text{in}$ 50 $\mu\text{in}$	(0 to 12) in (0 to 4) in	$(55 + 15L) \mu\text{in}$ $(34 + 15L) \mu\text{in}$	Gage blocks
Indicators  Up to 1 in  (1 to 4) in	50 $\mu\text{in}$ resolution 100 $\mu\text{in}$ resolution  50 $\mu\text{in}$ resolution 100 $\mu\text{in}$ resolution	$(20 + 0.6R) \mu\text{in}$ $(20 + 0.3R) \mu\text{in}$  $(4L + 0.5R) \mu\text{in}$ $(4L + 0.5R) \mu\text{in}$	Indicator calibrator  Gage blocks

VII. Mechanical

Parameter/Equipment	Range	Best Uncertainty <sup>2</sup> ( $\pm$ )	Comments
Torque <sup>3</sup> – Measure	(0 to 100) in·oz (0 to 100) in·lb (0 to 100) ft·lb	0.78 % of reading 0.67 % of reading 0.71 % of reading	Mountz torque system
Mass	Up to 200 g	0.0015 % of reading	Class 1 weights and balance
Scales (Platform & Spring) & Balances <sup>3</sup>	Up to 300 kg	1.0 LSVD	Class 1 & F weights LSVD = least significant value digit

<sup>1</sup> This laboratory offers commercial calibration service and on-site calibration services, where noted.

- <sup>2</sup> “Best Uncertainty” is the smallest uncertainty of measurement that a laboratory can achieve within its scope of accreditation when performing more or less routine calibrations of nearly ideal measurement standards of nearly ideal measuring equipment. Best uncertainties represent expanded uncertainties expressed at approximately the 95 % level of confidence, usually using a coverage factor of  $k = 2$ . The best uncertainty of a specific calibration performed by the laboratory may be greater than the best uncertainty due to the behavior of the customer’s device and to influences from the circumstances of the specific calibration.
- <sup>3</sup> On-site calibration service is available for this calibration. The uncertainties achievable on a customer's site can normally be expected to be larger than the Best Measurement Capabilities (BMC) that the accredited laboratory has been assigned as Best Uncertainty on the A2LA Scope. Allowance must be made for aspects such as the environment at the place of calibration and for other possible adverse effects such as those caused by transportation of the calibration equipment. The usual allowance for the uncertainty introduced by the item being calibrated, (e.g. resolution) must also be considered and this, on its own, could result in the calibration uncertainty being larger than the BMC.
- <sup>4</sup> In the statement of best uncertainty,  $L$  is the numerical value of the nominal length of the device measured in inches and  $R$  is the numerical value of the resolution of the device in microinches.
- <sup>5</sup> The measurands stated are generated with the Fluke 5500 & 5700 series of instruments. This capability is suitable for the calibration of the devices intended to measure the stated measurand in the ranges indicated. Best measurement uncertainties are expressed as either a specific value that covers the full range or as a fraction of the reading plus a fixed floor specification.
- <sup>6</sup> The measurands stated are measured with the HP 3458A. This capability is suitable for the calibration of the devices intended to generate the measurand in the ranges indicated. Best measurement uncertainties are expressed as either a specific value that covers the full range or as a combination of the fraction of the reading/output plus a range specification.