

**THE AMERICAN
ASSOCIATION
FOR LABORATORY
ACCREDITATION**

ACCREDITED LABORATORY

A2LA has accredited

J. H. METROLOGY CO., INC.
Rolling Meadows, IL


for technical competence in the field of

Calibration

The accreditation covers the specific calibrations listed on the agreed scope of accreditation. This laboratory meets the requirements of ISO/IEC 17025 - 1999 "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.

Presented this 29th day of August 2003.





President
For the Accreditation Council
Certificate Number: 1618.01
Valid to: May 31, 2005

Revised 04/01/05

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

SCOPE OF ACCREDITATION TO ISO/IEC 17025-1999
& ANSI/NCSL Z540-1-1994

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CALIBRATION

Valid To: May 31, 2005

Certificate Number: 1618.01

In recognition of the successful completion of the A2LA evaluation process, accreditation is granted to this laboratory to perform the following calibrations¹:

I. Electrical – DC/Low Frequency

Parameter/Equipment	Range	Best Uncertainty ^{2,3} (±)	Comments
DC Voltage Measuring Equipment	(0 to 10) V	2 ppm + 0.5 µV	Fluke 732A/Fluke 720A Kelvin-Varley divider
	10 V to 1 kV	9 ppm + 400 µV	Fluke 732A/752A/5440A
	(1 to 30) kV	0.066 % + 5 µV	Hallmark PVD kilovolt divider, Fluke 885AB
DC Voltage – Measure	(0 To 10) V	2 ppm + 0.5 µV	Fluke 732A/Fluke 720A Kelvin-Varley divider
	10 V To 1 kV	9 ppm + 400 µV	Fluke 732A/752A/5440A
	(1 to 30) kV	0.046 % + 5 µV	Hallmark PVD kilovolt divider, Fluke 885AB
DC Current – Measure	10 µA to 10 A	42 ppm	L&N 4000 series standard resistors, Biddle Cat. #601235 standard resistor and Fluke 8506A

Parameter/Equipment	Range	Best Uncertainty ^{2,3} (±)	Comments
DC Current – (cont) Measure	(10 to 15) A (15 to 100) A (100 to 300) A	120 ppm 400 ppm 450 ppm	Fluke 8506A w/L&N 4360 and 4361 shunt L&N 4363 shunt
DC Current Measuring Equipment	10 µA to 10 A (10 to 15) A (15 to 100) A (100 to 500) A	42 ppm 120 ppm 420 ppm 1.1 % + 0.05 A	L&N 4000 series standard resistor, L&N 4360 shunt, Fluke 8506A, and Fluke 5520A Fluke 8506A, Fluke 5440A, Ballantine 1620A and L&N 4361 shunt Fluke 5500A w/coil
Resistance – Measure Shunts	(0.1 to 10) Ω 10 Ω to 1 kΩ (1 to 100) kΩ 100 kΩ to 100 MΩ 0.01 Ω 0.001 Ω 0.001 Ω and below	92 ppm 36 ppm 24 ppm 56 ppm 120 ppm 160 ppm 580 ppm	ESI SR1010 standard resistors, General Radio 1666 L&N 4300 low ohms bridge, ratio divider box and Guildline type 1659 standard resistor L&N 4300 low ohms bridge and ratio divider box
Resistance – Generate	(0.1 to 100) Ω 10 Ω to 1 kΩ (1 to 100) kΩ 100 kΩ to 100 MΩ 0.01 Ω	76 ppm 39 ppm 39 ppm 40 ppm 17 ppm	ESI SR 1010 standard resistors ESI SR 1050 standard resistors Biddle Cat. #601235 standard resistor

Parameter/Equipment	Range	Best Uncertainty ^{2,3} (±)	Comments
Resistance – Generate (cont)	0.001 Ω	140 ppm	Guildline type 1659 standard resistor
	0.0001 Ω	160 ppm	L&N 4334B standard resistor
Capacitance – Measure @ 1 kHz	(10, 100, 1000) pF	18 ppm	General Radio 1615-A, General Radio 1404 series and ESI SC 1000 standard capacitors
	1 pF to 1 μF	120 ppm	General Radio 1615-A
Capacitance – Generate @ 1 kHz	(10, 100, 1000) pF	18 ppm	General Radio 1404 series and ESI SC 1000 standard capacitors
	1 pF to 1 μF	530 ppm + 0.7 pF	General Radio 1413 decade capacitor
Inductance – Generate @ 1 kHz	100 μH to 10 H	290 ppm	General Radio 1482 series standard inductors
Inductance – Measure @ 1 kHz	100 μH to 10 H	250 ppm	General Radio 1482 standard inductor and ESI DT 72A
Thermocouple Indicators –			Electrical calibration using Fluke 5440A, Hart Scientific 9101 ice point and ice point probe
Type E	-200 °C to 1000 °C	0.18 °C	
Type J	-200 °C to 1200 °C	0.18 °C	
Type K	-200 °C to 1372 °C	0.18 °C	
Type T	-250 °C to 400°C	0.18 °C	

Parameter/Equipment	Range	Best Uncertainty ^{2,3} (±)	Comments
RTD Indicators – Pt 385, 100Ω Pt 385, 200 Ω Pt 385, 500 Ω Pt 385, 1 kΩ PtNi 385, 120 Ω Pt 3916, 100 Ω Pt 3926, 100 Ω Cu 427, 10 Ω	-200 °C to 800 °C -190 °C to 630 °C -190 °C to 630 °C -190 °C to 630 °C -80 °C to 260 °C -200 °C to 630 °C -200 °C to 630 °C -100 °C to 260 °C	0.03 °C 0.03 °C 0.03 °C 0.03 °C 0.03 °C 0.03 °C 0.03 °C 0.03 °C	Electrical calibration using Decade resistors and standard resistors ESI RS925A, General Radio 1433T, ESI SR 1010

Parameter/Range	Frequency	Best Uncertainty ^{2,3} (±)	Comments
AC Current – Measure (2.5 to 5) mA (5 to 20) mA (20 to 300) mA 300 mA to 2 A (2 to 10) A	5 Hz to 20 kHz 5 Hz to 20 kHz 5 Hz to 20 kHz 5 Hz to 20 kHz 5 Hz to 20 kHz	160 ppm 160 ppm 160 ppm 160 ppm 140 ppm	Fluke 540B, A-40 shunts, 5100A, 8506A and L&N 4000 series standard resistors Fluke 540B, A-40 shunt, 5440A, 8506A, Fluke 5220A and Biddle Cat. #601235 standard resistor
AC Current Measuring Equipment – (2.5 to 5) mA (5 to 20) mA (20 to 300) mA	10 Hz to 20 kHz 10 Hz to 20 kHz 10 Hz to 20 kHz	160 ppm 160 ppm 160 ppm	Fluke 540B, 5520A, 5100A, 8506A, and L&N 4000 series standard resistor Fluke 540B, 5520A, 5100A, A-40 shunts, 8506A, and L&N 4000 series standard resistors

Parameter and Range	Frequency	Best Uncertainty ^{2,3} (±)	Comments
AC Current – Generate (cont) 300 mA to 2 A	10 Hz to 10 kHz	160 ppm	Fluke 540B, 5520A, 5100A, A-40 shunts, 8506A, and L&N 4000 series standard resistors
AC Voltage – Measure (0.5 to 500) V (0.5 to 50) V (20 to 50) V (0.5 to 10) V (100 to 500) V 1000 V (1 to 30) kV	5 Hz to 1 MHz (50 to 100) kHz (100 to 500) kHz 100 kHz to 1 MHz (50 to 100) kHz 5 Hz to 50 kHz 60 Hz	67 ppm 67 ppm 67 ppm 67 ppm 67 ppm 67 ppm .51 % + 0.005 %	Fluke 540B, 5440A Hallmark PVD kilovolt divider and Fluke 931B
AC Voltage – Generate (0.5 to 10) V (10 to 100) V (100 to 1000) V (1 to 6) kV	10 Hz to 1 MHz 10 Hz to 100 kHz 10 Hz to 50 kHz 60 Hz	76 ppm 76 ppm 78 ppm 0.25% + 0.002 %	Fluke 540B, 5200A, 5440A Fluke 540B, 5200A w/5205A, 5440A Fluke 5200A and Weston 311 type 2

II. Electrical – RF/Microwave

Parameter/Equipment	Range	Best Uncertainty ^{2,3} (±)	Comments
RF Power	(10 to 100) MHz	0.52 %	HP 478A-H75 and HP 34401A

III. Time and Frequency

Parameter/Equipment	Range	Best Uncertainty ^{2,3} (\pm)	Comments
Frequency – Generate	(0.1, 1, 5, 10) MHz	1 part in 10^{11}	WWVB and NBS receiver
Measure	DC to 18 GHz	1 part in 10^9	Rubidium and quartz oscillators

IV. Dimensional

Parameter/Equipment	Range	Best Uncertainty ^{2,3} (\pm)	Comments
Micrometers	(0 to 1) in (1 to 2) in (2 to 3) in (3 to 4) in (4 to 5) in (5 to 6) in (6 to 7) in (7 to 8) in (8 to 10) in (10 to 12) in (12 to 20) in	34 μ in 48 μ in 67 μ in 88 μ in 130 μ in 150 μ in 170 μ in 190 μ in 220 μ in 270 μ in 390 μ in	Gage blocks
Calipers	(0 to 40) in	190 μ in	Caliper checker
Height Gages	(0 to 36) in	130 μ in	Caliper checker
Depth Gages	(0 to 1) in (0 to 2) in (0 to 3) in (0 to 4) in (0 to 5) in (0 to 6) in (0 to 7) in (0 to 8) in (0 to 10) in (0 to 12) in	61 μ in 69 μ in 69 μ in 86 μ in 110 μ in 110 μ in 110 μ in 110 μ in 110 μ in 210 μ in	Gage blocks

Parameter/Equipment	Range	Best Uncertainty ^{2,3} (±)	Comments
Dial and Test Indicators	(0 to 1) in (0 to 2) in (0 to 3) in (0 to 4) in	17 µin 38 µin 63 µin 91 µin	Gage blocks
Cylindrical OD	(0 to 1) in (0 to 2) in (0 to 3) in (0 to 4) in (0 to 5) in (0 to 6) in (0 to 7) in (0 to 8) in (0 to 10) in	21 µin 36 µin 52 µin 68 µin 83 µin 100 µin 120 µin 140 µin 170 µin	Gage blocks and Supermicrometer
Cylindrical OD (Pin Sets)	(0 to 1) in	42 µin	Laser micrometer
Outside Threads	(0 to 1) in (0 to 2) in (0 to 3) in (0 to 4) in (0 to 5) in (0 to 6) in	32 µin 39 µin 57 µin 72 µin 87 µin 110 µin	Gage blocks, thread wires, and supermicrometer

V. Mechanical

Parameter/Equipment	Range	Best Uncertainty ^{2,3} (±)	Comments
Pressure – Generate	(0 to 100) psi (100 to 300) psi (0 to 1000) psi (1000 to 10 000) psi	0.032 % 0.16 psi 0.10 % 0.10 %	Pressure calibrator Deadweight tester
Torque – Measure	(0 to 2000) ft-lb	0.25 %	CDI Torque calibrator

Parameter/Equipment	Range	Best Uncertainty ^{2,3} (±)	Comments
Scales and Balances and Force Transducers	1 g	0.054 mg	Class 2 weights
	10 g	0.075 mg	
	20 g	0.11 mg	
	30 g	0.48 mg	
	50 g	0.26 mg	
	100 g	0.52 mg	
	200 g	1.1 mg	
	300 g	1.6 mg	
	500 g	2.6 mg	
	1000 g	5.2 mg	
	1.5 kg	5.3 mg	
3.0 kg	16 mg		
6.7 kg	19 mg		

VI. Thermodynamics

Parameter/Equipment	Range	Best Uncertainty ^{2,3} (±)	Comments
Temperature – Generate and Measure	-30 °C to 100 °C	0.044 °C	Minco S7929PA 1L120S RTD probe with Minco RTB 8078 resistance thermometer bridge and fluid bath
	30°C to 500 °C	0.58 °C	Minco S7929PA 1L120S RTD probe with Jofra 600S, dry well, and Minco RTB 8078 resistance thermometer bridge

¹ This laboratory offers commercial calibration service and on-site calibration service.

² Best Uncertainties represent expanded uncertainties using a coverage factor of k=2 which provides a level of confidence of approximately 95%.

³ The uncertainties achievable on a customer's site can 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.