



SCOPE OF ACCREDITATION TO ISO/IEC 17025:2005

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CALIBRATION

Valid To: August 31, 2016

Certificate Number: 3338.01

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

I. Dimensional

Parameter/Equipment	Range	CMC ^{2,6} (±)	Comments
Coordinate Measuring Machines (CMM) Performance Verification ³ – Length Measurement Error (EL)	Up to 59.05 in Up to 1500 mm	(120 + 2L) μin (1.4 + L/350) μm	ISO 10360-2 using gage blocks
Calipers ³	Up to 24 in	(300 + 7L) μin	Gage blocks
Height Gages ³	Up to 40 in	(290 + 0.06L) μin	Surface plate, gage blocks, length bars
Micrometers ³	Up to 1 in (1 to 2) in (2 to 10) in (10 to 24) in	(23 + 0.06L) μin (23 + 0.09L) μin (57 + 0.06L) μin (90 + 0.01L) μin	Gage blocks

Parameter/Equipment	Range	CMC ^{2, 6} (\pm)	Comments
Rules and Tapes	Up to 1200 mm	(860 + 75L) μ m	Magnifier and linear scales

II. Dimensional Testing/Calibration¹

Parameter/Equipment	Range	CMC ^{2, 6} (\pm)	Comments
Fixtures (3D) and Workpieces (3D) ^{3, 8}	Up to 2400 mm	(37 + 0.008L) μ m	Faro articulated arm CMM

III. Electrical – DC/Low Frequency

Parameter/Equipment	Range	CMC ^{2, 4, 5, 9} (\pm)	Comments
DC Voltage – Measuring Equipment ³	Up to 329.999 mV (0 to 3.299999) V (0 to 32.99999) V (30 to 329.9999) V (100 to 1020.000) V	0.05 μ V/V + 13 μ V 60 μ V/V + 0.02 mV 40 μ V/V + 1.1 mV 60 μ V/V + 1.9 mV 70 μ V/V + 1.6 mV	Fluke 5500A
DC Voltage – Measure ³	Up to 100 mV 100 mV to 1 V (1 to 10) V (10 to 100) V (100 to 1000) V (1 to 40) kV	41 μ V/V + 12 μ V 28 μ V/V + 0.1 mV 66 μ V/V + 1 mV 31 μ V/V + 11 mV 57 μ V/V + 14 mV 1.8 % + 0.11 kV	HP 34401 Fluke HV Probe

Parameter/Equipment	Range	CMC ^{2, 4, 5, 9} (\pm)	Comments
DC Current – Measuring Equipment ³	(0 to 3.29999) mA (0 to 32.9999) mA (0 to 329.999) mA (0 to 2.19999) A (0 to 11) A	0.016 % + 0.25 μ A 0.012 % + 0.32 μ A 0.014 % + 3 μ A 0.036 % + 40 μ A 0.07 % + 400 μ A	Fluke 5500A
Clamp-on Meters	Up to 550 A	0.16 % + 110 mA	Fluke 5500A/50 turn coil
DC Power – Generate ³ 33 mV to 1020 V	(3.3 to 8.99) mA (9 to 32.999) mA (33 to 89.99) mA (90 to 329.99) mA (0.33 to 0.8999) A (0.9 to 2.1999) A (2.2 to 4.4999) A (4.5 to 11) A	3.3 μ W/W + 1.1 mW 0.12 μ W/W + 1.1 mW 0.32 μ W/W + 1.1 mW 0.62 μ W/W + 0.7 mW 0.73 μ W/W + 0.3 mW 0.75 μ W/W + 0.1 mW 0.75 μ W/W + 43 μ W 0.75 μ W/W + 21 μ W	Fluke 5500A
Resistance – Generate ³	(0 to 10.99) Ω (11 to 32.999) Ω (33 to 109.999) Ω (110 to 329.99) Ω 330 Ω to 1.09999 k Ω (1.1 to 3.29999) k Ω (3.3 to 10.9999) k Ω (11 to 32.9999) k Ω (33 to 109.999) k Ω (110 to 329.999) k Ω 330 k Ω to 1.09999 M Ω (1.1 to 3.29999) M Ω (3.3 to 10.9999) M Ω (11 to 32.9999) M Ω (33 to 109.999) M Ω (110 to 330) M Ω	0.022 % + 0.098 Ω 0.010 % + 0.019 Ω 0.009 % + 0.02 Ω 0.008 % + 0.03 Ω 0.031 % + 0.07 Ω 0.033 % + 0.56 Ω 0.010 % + 0.76 Ω 0.007 % + 3.2 Ω 0.012 % + 8.1 Ω 0.014 % + 7.9 Ω 0.015 % + 120 Ω 0.017 % + 97 Ω 0.069 % + 740 Ω 0.10 % + 6.5 k Ω 0.58 % + 8.9 k Ω 0.59 % + 65 k Ω	Fluke 5500A

Parameter/Equipment	Range	CMC ^{2, 5, 9} (±)	Comments
Capacitance – Generate ³ @ 1 kHz	(1.1 to 3.2999) nF (3.3 to 10.999) nF (11 to 32.999) nF (33 to 109.99) nF (110 to 329.99) nF (0.33 to 1.0999) μF (1.1 to 3.2999) μF (3.3 to 10.999) μF (11 to 32.999) μF (33 to 109.99) μF (110 to 329.99) μF 330 μF to 1.1 mF	0.58 % + 12 pF 0.49 % + 25 pF 0.29 % + 120 pF 0.29 % + 120 pF 0.33 % + 300 pF 0.28 % + 1.6 nF 0.42 % + 3.5 nF 0.42 % + 12 nF 0.50 % + 32 nF 0.63 % + 0.13 μF 0.82 % + 0.04 μF 1.3 % + 0.16 μF	Fluke 5500A

Parameter/Range	Frequency	CMC ^{2, 4, 5, 9} (±)	Comments
AC Voltage – Generate ³ (1 to 32.999) mV (33 to 329.999) mV (0.33 to 3.29999) V (3.3 to 32.9999) V (33 to 329.999) V (330 to 1000) V	10 Hz to 500 kHz 10 Hz to 500 kHz 10 Hz to 500 kHz 10 Hz to 500 kHz 45 Hz to 20 kHz 45 Hz to 10 kHz	0.23 % + 30 μV 0.12 % + 30 μV 0.09 % + 10 mV 0.09 % + 10 mV 0.09 % + 20 mV 0.23 % + 0.12 V	Fluke 5500A
AC Voltage – Measure ³ Up to 100mV (1 to 750) V (0.75 to 25) kV (1 to 25) kV	(50 to 100) kHz (50 to 100) kHz 60 Hz 60 Hz	0.07 % + 48 μV 0.4 % + 230 mV 1.1 % + 0.58 kV 1.6 % + 0.026 kV	HP 34401 Fluke HV probe Tektronix HV probe
AC Current – Generate ³ (0.029 to 0.3299) mA (0.33 to 3.2999) mA (3.3 to 32.999) mA (33 to 329.99) mA (0.33 to 2.19999) A (2.2 to 11) A Clamp-on Meters Up to 550 A	10 Hz to 10 kHz 10 Hz to 10 kHz 10 Hz to 10 kHz 10 Hz to 10 kHz 10 Hz to 5 kHz 45 Hz to 1 kHz (46 to 65) Hz	0.24 % + 0.29 μA 0.14 % + 0.31 μA 0.13 % + 3.31 μA 0.10 % + 37 μA 0.12 % + 0.36 mA 0.12 % + 2 mA 0.13 % + 4.7 A	Fluke 5500A Fluke 5500A/ 50 turn coil

Parameter/Range	Frequency	CMC ^{2,5,9} (±)	Comments
AC Power Generate ³ –			Fluke 5500A
(33 to 329.999) mV @ (45 & 60) Hz	(3.3 to 8.99) mA (9 to 32.999) mA (33 to 89.99) mA (90 to 329.99) mA (0.33 to 0.8999) A (0.9 to 2.1999) A (2.2 to 4.4999) A (4.5 to 11) A	0.6 % + 0.17 μW 0.6 % + 0.16 μW 0.6 % + 0.18 mW 0.6 % + 0.18 mW 0.6 % + 1.8 mW 0.6 % + 1.8 mW 0.6 % + 9.9 mW 0.6 % + 9.9 mW	PF = 1
330 mV to 1020 V @ (45 & 60) Hz	(3.3 to 8.99) mA (9 to 32.999) mA (33 to 89.99) mA (90 to 329.99) mA (0.33 to 0.8999) A (0.9 to 2.1999) A (2.2 to 4.4999) A (4.5 to 11) A	0.1 % + 0.22 μW 0.1 % + 7.4 μW 0.1 % + 2.16 μW 0.1 % + 0.74 μW 0.1 % + 0.22 μW 0.1 % + 0.08 μW 0.1 % + 0.03 μW 0.1 % + 0.01 μW	PF = 1
(33 to 329.999) mV @ (45 & 60) Hz	(3.3 to 8.99) mA (9 to 32.999) mA (33 to 89.99) mA (90 to 329.99) mA (0.33 to 0.8999) A (0.9 to 2.1999) A (2.2 to 4.4999) A (4.5 to 11) A	0.64 % + 0.17 μW 0.64 % + 0.18 μW 0.4 % + 0.18 mW 0.4 % + 0.21 mW 0.6 % + 1.78 mW 0.6 % + 1.78 mW 0.6 % + 9.9 mW 0.6 % + 9.9 mW	PF = 0.8
330 mV to 1020 V @ (45 & 60) Hz	(3.3 to 8.99) mA (9 to 32.999) mA (33 to 89.99) mA (90 to 329.99) mA (0.33 to 0.8999) A (0.9 to 2.1999) A (2.2 to 4.4999) A (4.5 to 11) A	0.18 % + 3.9 μW 0.18 % + 1.4 μW 0.18 % + 0.38 μW 0.18 % + 0.14 μW 0.18 % + 0.03 μW 0.18 % + 0.013 μW 0.18 % + 0.005 μW 0.18 % + 0.003 μW	PF = 0.8

Parameter/Equipment	Range	CMC ² (±)	Comments
Electrical Simulation of RTD Indicators ³ –			
PT 385, 100 Ω	(-200 to -80) °C (-80 to 0) °C (0 to 100) °C (100 to 300) °C (300 to 400) °C (400 to 630) °C (630 to 800) °C	0.19 °C 0.19 °C 0.2 °C 0.21 °C 0.31 °C 0.45 °C 0.32 °C	Fluke 5500A and Fluke741B
PT 3916, 100 Ω	(-200 to -80) °C (-80 to 0) °C (0 to 100) °C (100 to 300) °C (300 to 400) °C (600 to 630) °C	0.34 °C 0.21 °C 0.19 °C 0.15 °C 0.21 °C 0.29 °C	
PT 3926, 100 Ω	(-200 to -80) °C (-80 to 0) °C (0 to 100) °C (100 to 300) °C (300 to 400) °C (400 to 630) °C	0.21 °C 0.19 °C 0.15 °C 0.16 °C 0.17 °C 0.23 °C	
PT 385, 200 Ω	(-200 to -80) °C (-80 to 0) °C (0 to 100) °C (100 to 260) °C (260 to 300) °C (300 to 400) °C (400 to 600) °C (600 to 630) °C	0.18 °C 0.13 °C 0.18 °C 0.21 °C 0.19 °C 0.32 °C 0.26 °C 0.22 °C	
PT 385, 500 Ω	(-200 to -80) °C (-80 to 0) °C (0 to 100) °C (100 to 260) °C (260 to 300) °C (300 to 400) °C (400 to 600) °C (600 to 630) °C	0.29 °C 0.21 °C 0.19 °C 0.14 °C 0.15 °C 0.15 °C 0.31 °C 0.22 °C	

Parameter/Equipment	Range	CMC ² (±)	Comments
Electrical Simulation of RTD Indicators ³ – (cont)			
PT 385, 1000 Ω	(-200 to -80) °C (-80 to 0) °C (0 to 100) °C (100 to 260) °C (260 to 300) °C (300 to 400) °C (400 to 600) °C (600 to 630) °C	0.2 °C 0.13 °C 0.13 °C 0.19 °C 0.14 °C 0.15 °C 0.15 °C 0.32 °C	Fluke 5500A and Fluke741B
Electrical Simulation of Thermocouple Indicators ³ –			
Type E	(-250 to -100) °C (-100 to -25) °C (-25 to 350) °C (350 to 650) °C (650 to 1000) °C	0.58 °C 0.19 °C 0.17 °C 0.19 °C 0.26 °C	Fluke 5500A and Fluke 741B
Type J	(-210 to -100) °C (-100 to -30) °C (-30 to 150) °C (150 to 760) °C (760 to 1200) °C	0.32 °C 0.19 °C 0.17 °C 0.19 °C 0.28 °C	
Type K	(-200 to -100) °C (-100 to -25) °C (-25 to 120) °C (120 to 1000) °C (1000 to 1372) °C	0.39 °C 0.22 °C 0.19 °C 0.31 °C 0.47 °C	
Type R	(0 to 250) °C (250 to 400) °C (400 to 1000) °C (1000 to 1767) °C	0.66 °C 0.41 °C 0.39 °C 0.47 °C	
Type S	(0 to 250) °C (250 to 1000) °C (1000 to 1400) °C (1400 to 1767) °C	0.55 °C 0.44 °C 0.44 °C 0.55 °C	

Parameter/Equipment	Range	CMC ^{2,4,9} (±)	Comments
Electrical Simulation of Thermocouple Indicators ³ – Continued Type T	(-250 to -150) °C (-150 to 0) °C (0 to 120) °C (120 to 400) °C	0.76 °C 0.29 °C 0.2 °C 0.18 °C	Fluke 5500A and Fluke 741B
Resistance ³	Up to 10 MΩ Up to 100 MΩ Up to 1000 MΩ	0.12 MΩ 0.11 + 0.1% MΩ 1.3 % MΩ	High resistance decade box PPM Inv

IV. Fluid Quantities

Parameter/Equipment	Range	CMC ^{2,6} (±)	Comments
Volume – Gravimetric Analysis ³	(10 to 2000) mL	(57 + 1.2V) μL	Analytical balance
	(2000 to 20 000) mL	(160 + 0.12V) μL	Electronic balance

V. Mechanical

Parameter/Equipment	Range	CMC ^{2,4} (±)	Comments
Analytical Balances ³	1 mg to 210 g	5 % + 1.1 mg	ASTM Class 1 weights
	Up to 20 kg	2.3 g + 0.002 %	NIST Class F weights
	Up to 1000 kg	0.11 kg + 0.002 %	OIML Class M1 weights

Parameter/Equipment	Range	CMC ^{2,4} (±)	Comments
Pressure ³	(0 to 30) psi	0.06 %	Crystal digital manometer
	(30 to 300) psi	0.06 %	Druck pressure calibrator
	(300 to 1000) psi	0.17 %	Crystal digital manometer
	(1000 to 10 000) psi	0.16 %	Ametek dead weight tester
Vacuum ³	(0 to -14.5) psi	0.37 % + 0.11 psi	Druck pressure calibrator
Force ³ – Tension	Up to 250 kg	0.005 % + 0.012 kg	Hanging method OIML Class M2
Torque Wrenches	(0 to 250) in•lb (25 to 250) lb•ft (250 to 1000) lb•ft	1.2 % 0.44 % 0.34 %	Load cell

VI. Thermodynamic

Parameter/Equipment	Range	CMC ² (±)	Comments
Temperature – Measuring Equipment ³	(-15 to 110) °C	0.59 °C	Hart dual dry block
	(50 to 350) °C	0.79 °C	
	(15 to 45) °C	0.55 °C	Rotronic hygrothermometer
Infrared Temperature – Measuring Equipment ³	(50 to 450) °C	1.3 °C	Hart calibrator 9132
Relative Humidity ³ – @ (20 to 35) °C Drybulb	(10 to 90) % RH	1.6 % RH	Rotronic Hygro Palm 3

VII. Time & Frequency

Parameter/Equipment	Range	CMC ² (±)	Comments
Frequency ³	(0.01 to 119.99) Hz (120.0 to 1199.9) Hz (1.200 to 11.999) kHz (12.00 to 119.99) kHz (120.0 to 1199.9) kHz (1.200 to 2.000) MHz	4.9 µHz/Hz + 0.16 Hz 4.3 µHz/Hz + 0.12 Hz 3.1 µHz/Hz + 1.6 Hz 4.6 µHz/Hz + 12 Hz 1.4 µHz/Hz + 120 Hz 0.8 µHz/Hz + 2 kHz	Fluke 5500A
Timers ³	Up to 3600 s	0.3 s/24 hr s	Stopwatch

This laboratory offers commercial dimensional testing/calibration service and field calibration service.

² Calibration and Measurement Capability Uncertainty (CMC) 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 or nearly ideal measuring equipment. CMCs represent expanded uncertainties expressed at approximately the 95 % level of confidence, usually using a coverage factor of $k = 2$. The actual measurement uncertainty of a specific calibration performed by the laboratory may be greater than the CMC due to the behavior of the customer's device and to influences from the circumstances of the specific calibration.

³ Field calibration service is available for this calibration and this laboratory meets A2LA R104 – *General Requirements: Accreditation of Field Testing and Field Calibration Laboratories* for these calibrations. Please note the actual measurement uncertainties achievable on a customer's site can normally be expected to be larger than the CMC found 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 actual uncertainty introduced by the item being calibrated, (e.g. resolution) must also be considered and this, on its own, could result in the actual measurement uncertainty achievable on a customer's site being larger than the CMC.

⁴ CMCs are expressed as percent of reading, unless otherwise indicated

⁵ The measurands stated are generated with the Fluke 5500A. The CMC for power output in watts or volts-amps-reactive (VARs) is based on the root sum square (rss) of the individual uncertainties in percent for the selected voltage, current, and power factor (*PF*) parameters.

⁶ In the statement of CMC, *L* is the numerical value of the nominal length of the device measured in inches for English Units and in meters for Metric Units; *V* is the numerical value of the nominal volume in mL units.

⁷ CMCs expressed as percent of full scale.

⁸ This laboratory meets R205 – *Specific Requirements: Calibration Laboratory Accreditation Program* for the types of dimensional tests listed above and is considered equivalent to that of a calibration.

⁹ The stated measured values are determined using the indicated instrument (see Comments). This capability is suitable for the calibration of the devices intended to measure or generate the measured value in the ranges indicated. CMCs are expressed as either a specific value that covers the full range or as a fraction/percentage of the reading plus a fixed floor specification



American Association for Laboratory Accreditation

Accredited Laboratory

A2LA has accredited

METRICA INDUSTRIAL SA DE CV

Monterrey, MEXICO

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 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 8 January 2009).

Presented this 7th day of November 2014.



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

President & CEO
For the Accreditation Council
Certificate Number 3338.01
Valid to August 31, 2016

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