



SCOPE OF ACCREDITATION TO ISO/IEC 17025:2005

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CALIBRATION

Valid To: September 30, 2018

Certificate Number: 3630.03

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 ^{2,4} (±)	Comments
Hand Tools ³ – Calipers (OD/ID/Depth) Depth Gages Height Gages Indicators Micrometers (ID/OD/Depth)	Up to 24 in (600 mm) Up to 6 in (150 mm) Up to 24 in (600 mm) Up to 1 in (25.4 mm) Up to 12 in (300 mm)	300 µin (7.7 µm) 300 µm (7.7 µm) 600 µm (15 µm) 11 µin (0.30 µm) (32 + 4.2L) µin (0.82 + 0.0042L) µm	Gage blocks, optical flats/parallels, ULM
Length – 1D	Up to 12 in	20 µin	Universal length machine

II. Electrical – DC/Low Frequency

Parameter/Equipment	Range	CMC ^{2,5,6} (±)	Comments
DC Voltage ³ – Measure	(0 to 100) mV (0.1 to 1) V (1 to 10) V (10 to 100) V (100 to 1020) V	11 μV/V + 0.35 μV 9.6 μV/V + 0.34 μV 9.6 μV/V + 0.57 μV 12 μV/V + 35 μV [12 + (14·V/1000) ²] μV/V + 120 μV	Agilent 3458A V = voltage
	(1 to 10) kV	0.05 %	Vitretek 4700
DC Voltage ³ – Generate	(0 to 329.9999) mV (0.33 to 3.299999) V (3.3 to 32.99999) V (33 to 329.9999) V (330 to 1000.000) V	16 μV/V + 0.78 μV 8.6 μV/V + 1.6 μV 9.4 μV/V + 16 μV 14 μV/V + 120 μV 14 μV/V + 1200 μV	Fluke 5500 series calibrator
DC Current ³ – Measure	(10 to 100) μA 100 μA to 1 mA (1 to 10) mA (10 to 100) mA 100 mA to 1 A	24 μA/A + 0.93 nA 24 μA/A + 5.8 nA 24 μA/A + 58 nA 41 μA/A + 0.58 μA 0.013 % + 12 μA	Agilent 3458A
	Clamp-On Meters	(20 to 149.999) A (150 to 549.999) A (550 to 1025) A	0.58 % + 0.17 A 0.58 % + 0.58 A 0.59 % + 0.58 A
DC Current ³ – Generate	(0 to 329.999) μA (0.330 to 3.29999) mA (3.3 to 32.9999) mA (33 to 329.999) mA (0.33 to 1.09999) A (1.1 to 2.99999) A (3 to 10.9999) A (11 to 20.5) A	0.012 % + 0.016 μA 78 μA/A + 0.039 μA 78 μA/A + 0.20 μA 78 μA/A + 2.0 μA 0.016 % + 32 μA 0.03 % + 32 μA 0.039 % + 390 μA 0.078 % + 580 μA	Fluke 5500 series calibrator

Parameter/Equipment	Range	CMC ^{2,5} (±)	Comments
Resistance ³ – Measure	(0.47 to 10) Ω (10 to 100) Ω 100 Ω to 1 kΩ (1 to 10) kΩ (10 to 100) kΩ 100 kΩ to 1 MΩ (1 to 10) MΩ	18 μΩ/Ω + 58 μΩ 15 μΩ/Ω + 0.58 mΩ 13 μΩ/Ω + 0.57 mΩ 13 μΩ/Ω + 5.7 mΩ 13 μΩ/Ω + 56 mΩ 18 μΩ/Ω + 2.3 Ω 58 μΩ/Ω + 120 Ω	Agilent 3458A
Resistance ³ – Generate	(0 to 10.9999) Ω (11 to 32.9999) Ω (33 to 109.9999) Ω (110 to 329.9999) Ω (330 to 1.099999) kΩ (1.1 to 3.299999) kΩ (3.3 to 10.99999) kΩ (11 to 32.99999) kΩ (33 to 109.9999) kΩ (110 to 329.9999) kΩ 330 kΩ to 1.099999 MΩ (1.1 to 3.299999) MΩ (3.3 to 10.99999) MΩ (11 to 32.99999) MΩ (33 to 109.9999) MΩ (110 to 329.9999) MΩ (330 to 1100) MΩ	32 μΩ/Ω + 0.78 mΩ 24 μΩ/Ω + 1.2 mΩ 22 μΩ/Ω + 1.1 mΩ 22 μΩ/Ω + 1.6 mΩ 22 μΩ/Ω + 1.6 mΩ 22 μΩ/Ω + 16 mΩ 22 μΩ/Ω + 16 mΩ 22 μΩ/Ω + 0.16 Ω 22 μΩ/Ω + 0.16 Ω 25 μΩ/Ω + 1.6 Ω 25 μΩ/Ω + 1.6 Ω 47 μΩ/Ω + 24 Ω 0.011 % + 36 Ω 0.02 % + 2.0 kΩ 0.039 % + 2.4 kΩ 0.24 % + 78 kΩ 1.2 % + 390 kΩ	Fluke 5500 series calibrator
AC Voltage ³ – Measure (1 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	0.035 % + 3.5 μV 0.024 % + 1.3 μV 0.035 % + 1.3 μV 0.12 % + 1.3 μV 0.58 % + 1.3 μV 4.7 % + 2.4 μV	Agilent 3458A

Parameter/Range	Frequency	CMC ^{2,5} (±)	Comments
AC Voltage ³ – Measure (cont)			
(10 to 100) 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 300 kHz to 1 MHz (1 to 2) MHz	81 µV/V + 4.7 µV 81 µV/V + 2.4 µV 0.017 % + 2.4 µV 0.035 % + 2.4 µV 0.093 % + 2.4 µV 0.35 % + 12 µV 1.2 % + 12 µV 1.8 % + 12 µV	Agilent 3458A
(0.1 to 1.0) 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	81 µV/V + 47 µV 81 µV/V + 24 µV 0.017 % + 24 µV 0.035 % + 24 µV 0.093 % + 24 µV 0.35 % + 120 µV 1.2 % + 120 µV 1.8 % + 120 µV	
(1.0 to 10.0) 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	81 µV/V + 0.47 mV 81 µV/V + 0.24 mV 0.017 % + 0.24 mV 0.035 % + 0.24 mV 0.093 % + 0.24 mV 0.35 % + 1.2 mV 1.2 % + 1.2 mV 1.8 % + 1.2 mV	
(10.0 to 100.0) 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	0.024 % + 4.7 mV 0.024 % + 2.4 mV 0.024 % + 2.4 mV 0.041 % + 2.4 mV 0.14 % + 2.4 mV 0.47 % + 12 mV 1.8 % + 12 mV	

Parameter/Range	Frequency	CMC ^{2,5,6} (±)	Comments
AC Voltage ³ – Measure (cont)			
(100.0 to 700) V	(1 to 40) Hz 40 Hz to 1 kHz (1 to 20) kHz (20 to 50) kHz (50 to 100) kHz	0.047 % + 47 mV 0.047 % + 24 mV 0.07 % + 24 mV 0.14 % + 24 mV 0.35 % + 24 mV	Agilent 3458A
(1 to 5) kV	60 Hz	0.15 %	Vitrek 4700
AC Voltage ³ – Generate			
(1 to 32.999) mV	(10 to 45) Hz 45 Hz to 10 kHz (10 to 20) kHz (20 to 50) kHz (50 to 100) kHz (100 to 500) kHz	0.063 % + 4.7 μV 0.012 % + 4.7 μV 0.016 % + 4.7 μV 0.078 % + 4.7 μV 0.28 % + 9.4 μV 0.63 % + 39 μV	Fluke 5500 series calibrator
(33 to 329.999) mV	(10 to 45) Hz 45 Hz to 10 kHz (10 to 20) kHz (20 to 50) kHz (50 to 100) kHz (100 to 500) kHz	0.024 % + 6.3 μV 0.012 % + 6.3 μV 0.013 % + 6.3 μV 0.028 % + 6.3 μV 0.063 % + 25 μV 0.16 % + 55 μV	
(0.33 to 3.29999) V	(10 to 45) Hz 45 Hz to 10 kHz (10 to 20) kHz (20 to 50) kHz (50 to 100) kHz (100 to 500) kHz	0.024 % + 39 μV 0.012 % + 47 μV 0.015 % + 47 μV 0.024 % + 39 μV 0.055 % + 97 μV 0.19 % + 470 μV	
(3.3 to 32.9999) V	(10 to 45) Hz 45 Hz to 10 kHz (10 to 20) kHz (20 to 50) kHz (50 to 100) kHz	0.024 % + 510 μV 0.012 % + 470 μV 0.019 % + 470 μV 0.028 % + 470 μV 0.07 % + 1300 μV	

Parameter/Range	Frequency	CMC ^{2,5} (±)	Comments
AC Voltage ³ – Generate (cont)			
(33 to 329.999) V	45 Hz to 1 kHz (1 to 10) kHz (10 to 20) kHz (20 to 50) kHz (50 to 100) kHz	0.015 % + 1600 μV 0.016 % + 4700 μV 0.02 % + 4700 μV 0.024 % + 4700 μV 0.16 % + 39 000 μV	Fluke 5500 series calibrator
(330 to 1020) V	45 Hz to 1 kHz (1 to 5) kHz (5 to 10) kHz	0.024 % + 7800 μV 0.02 % + 7800 μV 0.024 % + 7800 μV	
AC Current ³ – Generate			
(29 to 329.99) μA	(10 to 20) Hz (20 to 45) Hz 45 Hz to 1 kHz (1 to 5) kHz (5 to 10) kHz (10 to 30) kHz	0.16 % + 0.078 μA 0.12 % + 0.078 μA 0.097 % + 0.078 μA 0.24 % + 0.12 μA 0.63 % + 0.16 μA 1.3 % + 0.32 μA	Fluke 5500 series calibrator
(0.33 to 3.2999) mA	(10 to 20) Hz (20 to 45) Hz 45 Hz to 1 kHz (1 to 5) kHz (5 to 10) kHz (10 to 30) kHz	0.16 % + 0.12 μA 0.097 % + 0.12 μA 0.078 % + 0.12 μA 0.16 % + 0.16 μA 0.39 % + 0.24 μA 0.78 % + 0.47 μA	
(3.3 to 32.999) mA	(10 to 20) Hz (20 to 45) Hz 45 Hz to 1 kHz (1 to 5) kHz (5 to 10) kHz (10 to 30) kHz	0.14 % + 1.6 μA 0.07 % + 1.6 μA 0.032 % + 1.6 μA 0.063 % + 1.6 μA 0.16 % + 2.4 μA 0.32 % + 3.2 μA	
(33 to 329.99) mA	(10 to 20) Hz (20 to 45) Hz 45 Hz to 1 kHz (1 to 5) kHz (5 to 10) kHz (10 to 30) kHz	0.14 % + 16 μA 0.07 % + 16 μA 0.032 % + 16 μA 0.078 % + 39 μA 0.16 % + 78 μA 0.32 % + 160 μA	

Parameter/Range	Frequency	CMC ^{2,5} (±)	Comments
AC Current ³ – Generate (cont)			
(0.33 to 1.09999) A	(10 to 45) Hz 45 Hz to 1 kHz (1 to 5) kHz (5 to 10) kHz	0.14 % + 78 µA 0.039 % + 78 µA 0.47 % + 780 µA 2.0 % + 3900 µA	Fluke 5500 series calibrator
(1.1 to 2.99999) A	(10 to 45) Hz 45 Hz to 1 kHz (1 to 5) kHz (5 to 10) kHz	0.14 % + 78 µA 0.047 % + 78 µA 0.47 % + 780 µA 2.0 % + 3900 µA	
(3 to 10.9999) A	(45 to 100) Hz 100 Hz to 1 kHz (1 to 5) kHz	0.047 % + 1600 µA 0.078 % + 1600 µA 2.4 % + 1600 µA	
(11 to 20.5) A	(45 to 100) Hz 100 Hz to 1 kHz (1 to 5) kHz	0.094 % + 3900 µA 0.12 % + 3900 µA 2.4 % + 3900 µA	
Clamp-On Meters: (Toroidal Type)			
(20 to 54.999) A (55 to 149.999) A (150 to 1025) A	(45 to 65) Hz	0.31 % + 0.054 A 0.34 % + 0.042 A 0.34 % + 0.13 A	Fluke 5500 series w/ Fluke 5500A/coil
(20 to 54.999) A (55 to 149.999) A (150 to 400) A	(65 to 440) Hz	0.93 % + 0.054 A 0.94 % + 0.046 A 1.2 % + 0.22 A	
(Non-Toroidal Type)			
(20 to 149.999) A (150 to 549.999) A	(45 to 65) Hz	0.65 % + 0.30 A 0.66 % + 1.1 A	
Capacitance ³ – Generate			
(0.19 to 0.39999) nF (0.4 to 1.0999) nF (1.1 to 3.2999) nF (3.3 to 10.999) nF (11 to 32.9999) nF (33 to 109.999) nF (110 to 329.999) nF	10 Hz to 10 kHz 10 Hz to 10 kHz 10 Hz to 3 kHz 10 Hz to 1 kHz 10 Hz to 1 kHz 10 Hz to 1 kHz 10 Hz to 1 kHz	0.39 % + 0.0078 nF 0.39 % + 0.0078 nF 0.39 % + 0.0078 nF 0.20 % + 0.0078 nF 0.20 % + 0.078 nF 0.20 % + 0.078 nF 0.20 % + 0.24 nF	Fluke 5500 series calibrator

Parameter/Range	Frequency	CMC ^{2,5} (±)	Comments
Capacitance ³ – Generate (cont)			
(0.33 to 1.09999) μF	(10 to 600) Hz	0.20 % + 0.78 nF	Fluke 5500 series calibrator
(1.1 to 3.29999) μF	(10 to 300) Hz	0.20 % + 2.4 nF	
(3.3 to 10.9999) μF	(10 to 150) Hz	0.20 % + 7.8 nF	
(11 to 32.9999) μF	(10 to 120) Hz	0.32 % + 24 nF	
(33 to 109.999) μF	(10 to 80) Hz	0.35 % + 78 nF	
(110 to 329.999) μF	(0 to 50) Hz	0.35 % + 240 nF	
(0.33 to 1.09999) mF	(0 to 20) Hz	0.35 % + 0.78 μF	
(1.1 to 3.2999) mF	(0 to 6) Hz	0.35 % + 2.4 μF	
(3.3 to 10.9999) mF	(0 to 2) Hz	0.35 % + 7.8 μF	
(11 to 32.9999) mF	(0 to 0.6) Hz	0.59 % + 24 μF	
(33 to 110) mF	(0 to 0.2) Hz	0.86 % + 78 μF	

Parameter/Equipment	Range	CMC ² (±)	Comments
Electrical Simulation of Thermocouples & Thermocouple Indicating Devices ³ – Generate			
Type B	(600 to 800) °C	0.35 °C	Fluke 5500 series calibrator
	(800 to 1000) °C	0.27 °C	
	(1000 to 1550) °C	0.24 °C	
	(1550 to 1820) °C	0.26 °C	
Type E	(-250 to -100) °C	0.39 °C	
	(-100 to -25) °C	0.13 °C	
	(-25 to 350) °C	0.11 °C	
	(350 to 650) °C	0.13 °C	
	(650 to 1000) °C	0.17 °C	

Parameter/Equipment	Range	CMC ² (±)	Comments
Electrical Simulation of Thermocouples & Thermocouple Indicating Devices ³ – Generate (cont)			
Type J	(-210 to -100) °C (-100 to -30) °C (-30 to 150) °C (150 to 760) °C (760 to 1200) °C	0.21 °C 0.13 °C 0.11 °C 0.14 °C 0.18 °C	Fluke 5500 series calibrator
Type K	(-200 to -100) °C (-100 to -25) °C (-25 to 120) °C (120 to 1000) °C (1000 to 1372) °C	0.26 °C 0.14 °C 0.13 °C 0.21 °C 0.32 °C	
Type N	(-200 to -100) °C (-100 to -25) °C (-25 to 120) °C (120 to 410) °C (410 to 1300) °C	0.32 °C 0.18 °C 0.15 °C 0.14 °C 0.21 °C	
Type R	(0 to 250) °C (250 to 400) °C (400 to 1000) °C (1000 to 1767) °C	0.45 °C 0.28 °C 0.26 °C 0.32 °C	
Type S	(0 to 250) °C (250 to 1000) °C (1000 to 1400) °C (1400 to 1767) °C	0.37 °C 0.28 °C 0.29 °C 0.36 °C	
Type T	(-250 to -150) °C (-150 to 0) °C (0 to 120) °C (120 to 400) °C	0.49 °C 0.19 °C 0.13 °C 0.11 °C	

Parameter/Equipment	Range	CMC ^{2,5} (±)	Comments
Electrical Simulation of RTD Indicators & Indicating Systems 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	0.039 °C 0.039 °C 0.055 °C 0.07 °C 0.078 °C 0.094 °C 0.18 °C	Fluke 5500 series calibrator
Oscilloscopes ³ – DC & Square Wave DC Signal Square Wave Leveled Sine Wave Time Marker	Into 50 Ω Into 1 MΩ Into 1 MΩ 50 kHz reference Relative to 50 kHz Reference: 50 kHz to 100 MHz (100 to 300) MHz (300 to 500) MHz 50 ms to 5 s 2 ns to 20 ms	0.20 % + 32 μV 0.039 % + 32 μV 0.078 % + 32 μV 1.6 % + 240 μV 1.2 % + 78 μV 1.6 % + 78 μV 3.2 % + 78 μV 140 μs/s 2.0 μs/s	Fluke 5522A/SC1100

III. Mechanical

Parameter/Equipment	Range	CMC ^{2,6} (±)	Comments
Pressure Gages	(0 to 10 000) psi	0.1 %	Digital pressure standard

IV. Time & Frequency

Parameter/Equipment	Range	CMC ^{2,6} (±)	Comments
Frequency ³ – Measure	(1 to 40) Hz 40 Hz to 10 MHz	0.058 % 0.12 %	Agilent 3458A
Frequency ³ – Measuring Equipment	0.01 Hz to 2 MHz Up to 500 MHz	2 µHz/Hz + 3.9 µHz 2 µHz/Hz	Fluke 5522A Fluke 5522A/SC1100

¹ This laboratory offers commercial calibration service and field calibration service where noted.

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 In the statement of CMC, L is the numerical value of the nominal length of the device measured in inches for Imperial units, or in millimeters for metric units.

⁵ 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 percent or fraction of the reading plus a fixed floor specification.

⁶ In the statement of CMC, percentages are to be read as percent of reading, unless otherwise noted.



Accredited Laboratory

A2LA has accredited

PYLON ELECTRONICS INC.

Mississauga, Ontario, CANADA

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 R205 – *Specific Requirements: Calibration Laboratory Accreditation Program*. 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 3rd day of October 2016.



A handwritten signature in blue ink, reading "Jim C. Bunt".

Senior Director of Quality and Communications
For the Accreditation Council
Certificate Number 3630.03
Valid to September 30, 2018

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