



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

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CALIBRATION

Valid To: May 31, 2012

Certificate Number: 3023.01

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

I. Electrical

Parameter/Equipment	Range	CMC ^{2, 4, 5, 6} (±)	Comments
DC Voltage ³ – Generate	(1 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	5.7 µV/V + 0.75 µV 4.8 µV/V + 1.2 µV 3.9 µV/V + 4 µV 3.9 µV/V + 8 µV 4.7 µV/V + 100 µV 6.3 µV/V + 600 µV	Fluke 5700A
DC Voltage ³ – Measure	Up to 200 mV (0.2 to 2) V (2 to 20) V (20 to 200) V (200 to 1000) V	5.4 µV/V + 0.1 µV 3.2 µV/V + 0.4 µV 3.2 µV/V + 4 µV 4.6 µV/V + 40 µV 4.6 µV/V + 500 µV	Fluke 8508A
DC Voltage ³ – Measure High Voltage	(1001 to 2000) V (2001 to 20 000) V	0.064 % + 0.4 V 0.24 % + 4 V	Vitrek 4600A

Parameter/Range	Frequency	CMC ^{2,4} (±)	Comments
AC Voltage ³ – Generate			
(1 to 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	0.11 % + 5 μV 0.08 % + 5 μV 0.08 % + 5 μV 0.13 % + 5 μV 0.19 % + 8 μV 0.32 % + 15 μV 0.47 % + 30 μV 0.59 % + 30 μV	Fluke 5700A
(2.2 to 22) 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	0.05 % + 6 μV 0.02 % + 6 μV 0.02 % + 6 μV 0.04 % + 6 μV 0.08 % + 8 μV 0.12 % + 15 μV 0.16 % + 30 μV 0.30 % + 30 μV	
(22 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 to 300) kHz (300 to 500) kHz 500 kHz to 1 MHz	0.04 % + 16 μV 0.02 % + 10 μV 0.01 % + 10 μV 0.03 % + 10 μV 0.06 % + 30 μV 0.08 % + 30 μV 0.14 % + 40 μV 0.28 % + 100 μV	
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 to 300) kHz (300 to 500) kHz 500 kHz to 1 MHz	0.043 % + 100 μV 0.013 % + 30 μV 0.006 % + 7 μV 0.011 % + 20 μV 0.020 % + 80 μV 0.036 % + 150 μV 0.087 % + 400 μV 0.18 % + 1 mV	
(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 to 300) kHz (300 to 500) kHz 500 kHz to 1 MHz	0.043 % + 1 mV 0.013 % + 300 μV 0.006 % + 70 μV 0.011 % + 200 μV 0.020 % + 400 μV 0.045 % + 1.7 mV 0.11 % + 5 mV 0.23 % + 9 mV	

Parameter/Range	Frequency	CMC ^{2, 4, 5, 6} (\pm)	Comments
AC Voltage ³ – Generate (cont)			
(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	0.043 % + 10 mV 0.013 % + 3 mV 0.007 % + 1 mV 0.018 % + 4 mV 0.043 % + 10 mV	Fluke 5700A
(220 to 1100) V	50 Hz to 1 kHz	0.007 % + 4 mV	
AC Voltage ³ – Measure			
Up to 200 mV	(1 to 10) Hz (10 to 40) Hz (40 to 100) Hz 100 Hz to 2 kHz (2 to 10) kHz (10 to 30) kHz (30 to 100) kHz	0.017 % + 14 μ V 0.013 % + 4 μ V 0.011 % + 4 μ V 0.012 % + 2 μ V 0.011 % + 4 μ V 0.031 % + 8 μ V 0.071 % + 20 μ V	Fluke 8508A
200 mV to 2 V	(1 to 10) Hz (10 to 40) Hz (40 to 100) Hz 100 Hz to 2 kHz (2 to 10) kHz (10 to 30) kHz (30 to 100) kHz (100 to 300) kHz 300 kHz to 1 MHz	0.015 % + 120 μ V 0.011 % + 20 μ V 96 μ V/V + 20 μ V 69 μ V/V + 20 μ V 88 μ V/V + 20 μ V 0.021 % + 40 μ V 0.051 % + 200 μ V 0.30 % + 2 mV 1.0 % + 20 mV	
(2 to 20) V	(1 to 10) Hz (10 to 40) Hz (40 to 100) Hz 100 Hz to 2 kHz (2 to 10) kHz (10 to 30) kHz (30 to 100) kHz (100 to 300) kHz 300 kHz to 1 MHz	0.015 % + 1.2 mV 0.011 % + 200 μ V 91 μ V/V + 200 μ V 70 μ V/V + 200 μ V 89 μ V/V + 200 μ V 0.021 % + 400 μ V 0.051 % + 2 mV 0.30 % + 20 mV 1.0 % + 200 mV	
(20 to 200) V	(1 to 10) Hz (10 to 40) Hz (40 to 100) Hz 100 Hz to 2 kHz (2 to 10) kHz (10 to 30) kHz	0.015 % + 12 mV 0.012 % + 2 mV 97 μ V/V + 2 mV 76 μ V/V + 2 mV 94 μ V/V + 2 mV 0.021 % + 4 mV	

Parameter/Range	Frequency	CMC ^{2,5,6} (±)	Comments
AC Voltage – Measure (cont)			
(20 to 200) V	(30 to 100) kHz (100 to 300) kHz 300 kHz to 1 MHz	0.051 % + 20 mV 0.30 % + 200 mV 1.0 % + 2 V	Fluke 8508A
(200 to 1000) V	(1 to 10) Hz (10 to 40) Hz 40 Hz to 10 kHz (10 to 30) kHz (30 to 100) kHz	0.015 % + 70 mV 0.012 % + 20 mV 98 μV/V + 20 mV 0.021 % + 40 mV 0.054 % + 200 mV	
AC Voltage – Measure High Voltage			
(1001 to 2000) V	(20 to 100) Hz	0.14 % + 2 V	Vitretek 4600A
(2001 to 15 000) V	(20 to 100) Hz	0.60 % + 20 V	

Parameter/Equipment	Range	CMC ^{2,4,5} (±)	Comments
DC Current ³ – Generate	Up to 220 μA 220 μA to 2.2 mA (2.2 to 22) mA (22 to 220) mA 220 mA to 2.2 A (2.2 to 3.0) A (3 to 11) A (11 to 20) A	40 μA/A + 10 nA 39 μA/A + 10 nA 40 μA/A + 100 nA 47 μA/A + 1 μA 64 μA/A + 30 μA 0.024 % + 40 μA 0.030 % + 500 μA 0.063 % + 750 μA	Fluke 5700A Fluke 5520
Clamp-On (Effective Current) – Non- Toroidal	(20 to 150) A (150 to 1000) A	0.57 % + 0.14 A 0.56 % + 0.5 A	Fluke 5520A with 50 turn coil
DC Current ³ – Measure	Up to 200 μA 200 μA to 2 mA (2 to 20) mA (20 to 200) mA 200 mA to 2 A (2 to 20) A (21 to 100) A (101 to 300) A	11 μA/A + 0.4 nA 11 μA/A + 4.0 nA 12 μA/A + 40 nA 31 μA/A + 0.8 μA 140 μA/A + 16 μA 300 μA/A + 400 μA 0.04 % 0.04 %	Fluke 8508A L&N Shunts

Parameter/Range	Frequency	CMC ^{2,4,5} (±)	Comments
AC Current ³ – Generate			
Up to 220 µA	(10 to 20) Hz (20 to 40) Hz 40 Hz to 1 kHz (1 to 5) kHz (5 to 10) kHz	0.055 % + 30 nA 0.030 % + 25 nA 0.012 % + 20 nA 0.047 % + 50 nA 0.13 % + 100 nA	Fluke 5700A
220 µA to 2.2 mA	(10 to 20) Hz (20 to 40) Hz 40 Hz to 1 kHz (1 to 5) kHz (5 to 10) kHz	0.055 % + 50 nA 0.030 % + 40 nA 0.012 % + 40 nA 0.047 % + 500 nA 0.13 % + 1 µA	
(2.2 to 22) mA	(10 to 20) Hz (20 to 40) Hz 40 Hz to 1 kHz (1 to 5) kHz (5 to 10) kHz	0.055 % + 500 nA 0.030 % + 400 nA 0.012 % + 400 nA 0.047 % + 5 µA 0.13 % + 10 µA	
(22 to 220) mA	(10 to 20) Hz (20 to 40) Hz 40 Hz to 1 kHz (1 to 5) kHz (5 to 10) kHz	0.054 % + 5 µA 0.030 % + 4 µA 0.013 % + 4 µA 0.047 % + 50 µA 0.13 % + 100 µA	
220 mA to 2.2 A	40 Hz to 1 kHz (1 to 5) kHz (5 to 10) kHz	0.051 % + 40 µA 0.058 % + 100 µA 0.70 % + 200 µA	
(2.2 to 3) A	(10 to 45) Hz 45 Hz to 1 kHz (1 to 5) kHz (5 to 10) kHz	0.12 % + 100 µA 0.04 % + 100 µA 0.39 % + 1mA 1.6 % + 5mA	Fluke 5520A
(3 to 11) A	(45 to 100) Hz (100 to 1000) Hz (1 to 5) kHz	0.041 % + 2 mA 0.064 % + 2 mA 1.9 % + 2 mA	
(11 to 20) A	(45 to 100) Hz (100 to 1000) Hz (1 to 5) kHz	0.08 % + 5 mA 0.10 % + 5 mA 1.9 % + 5 mA	

Parameter/Range	Frequency	CMC ^{2,4,5} (±)	Comments
Clamp-On (Effective Current) – Toroidal Type			
(20 to 150) A	(45 to 65) Hz (65 to 440) Hz	0.39 % 0.85 %	Fluke 5520A with 50 turn coil
(150 to 1000) A	(45 to 65) Hz (65 to 440) Hz	0.39 % 0.85 %	
Clamp-On (Effective Current) – Non-Toroidal Type			
(20 to 150) A	(45 to 65) Hz (65 to 440) Hz	0.77% 1.2%	Fluke 5520A with 50 turn coil
(150 to 1000) A	(45 to 65) Hz (65 to 440) Hz	0.7% 1.1%	
AC Current ³ – Measure			
Up to 200 µA	(1 to 10) Hz 10 Hz to 10 kHz (10 to 30) kHz (30 to 100) kHz	0.030 % + 20 nA 0.029 % + 20 nA 0.068 % + 20 nA 0.40 % + 20 nA	Fluke 8508A
200 µA to 2 mA	(1 to 10) Hz 10 Hz to 10 kHz (10 to 30) kHz (30 to 100) kHz	0.029 % + 200 nA 0.029 % + 200 nA 0.065 % + 200 nA 0.40 % + 200 nA	
(2 to 20) mA	(1 to 10) Hz 10 Hz to 10 kHz (10 to 30) kHz (30 to 100) kHz	0.029 % + 2 µA 0.028 % + 2 µA 0.065 % + 2 µA 0.40 % + 2 µA	
(20 to 200) mA	(1 to 10) Hz 10 Hz to 10 kHz (10 to 30) kHz	0.029 % + 20 µA 0.025 % + 20 µA 0.060 % + 20 µA	
200 mA to 2 A	10 Hz to 2kHz (2 to 10) kHz (10 to 30) kHz	0.06 % + 200 µA 0.07 % + 200 µA 0.30 % + 200 µA	
(2 to 20) A	10 Hz to 2 kHz (2 to 10) kHz	0.080 % + 2 mA 0.25 % + 2 mA	

Parameter/Equipment	Range	CMC ^{2,4,5} (±)	Comments
DC Resistance ³ – Generate	Up to 1.0 Ω (1.1 to 1.9) Ω (2 to 19) Ω (20 to 190) Ω 200 Ω to 1.9 kΩ (2 to 19) kΩ (20 to 190) kΩ 200 kΩ to 1.9 MΩ (2 to 19) MΩ (20 to 100) MΩ	54 μΩ/Ω 76 μΩ/Ω 23 μΩ/Ω 14 μΩ/Ω 10 μΩ/Ω 10 μΩ/Ω 11 μΩ/Ω 16 μΩ/Ω 39 μΩ/Ω 110 μΩ/Ω	ESI SR1-1.0 Fluke 5700A
DC Resistance ³ – Measure	Up to 2 Ω (2 to 20) Ω (20 to 200) Ω 200 Ω to 2 kΩ (2 to 20) kΩ (20 to 200) kΩ 200 kΩ to 2 MΩ (2 to 20) MΩ (20 to 200) MΩ 200 MΩ to 1 GΩ (1.1 to 10) GΩ	17 μΩ/Ω + 4 μΩ 9.5 μΩ/Ω + 14 μΩ 7.8 μΩ/Ω + 50 μΩ 7.8 μΩ/Ω + 500 μΩ 7.8 μΩ/Ω + 5 mΩ 8.1 μΩ/Ω + 50 mΩ 10 μΩ/Ω + 1 Ω 19 μΩ/Ω + 10 Ω 76 μΩ/Ω + 1 kΩ 0.02 % + 100 kΩ 0.08 %	Fluke 8508A, High voltage mode Guildline 9520

Parameter/Range	Frequency	CMC ^{2,4} (±)	Comments
Capacitance ³ – Generate			
(0.19 to 0.4) nF	10 Hz to 10 kHz	0.58 % + 0.01 nF	Fluke 5520A
(0.4 to 1.1) nF	10 Hz to 10 kHz	0.44 % + 0.01 nF	
(1.1 to 3.3) nF	10 Hz to 3 kHz	0.32 % + 0.01 nF	
(3.3 to 11) nF	10 Hz to 1 kHz	0.16 % + 0.01 nF	
(11 to 33) nF	10 Hz to 1 kHz	0.16 % + 0.1 nF	
(33 to 110) nF	10 Hz to 1 kHz	0.16 % + 0.1 nF	
(110 to 330) nF	10 Hz to 1 kHz	0.16 % + 0.3 nF	
(0.33 to 1.1) μF	(10 to 600) Hz	0.16 % + 1 nF	
(1.1 to 3.3) μF	(10 to 300) Hz	0.16 % + 3 nF	
(3.3 to 11) μF	(10 to 150) Hz	0.17 % + 10 nF	
(11 to 33) μF	(10 to 120) Hz	0.24 % + 30 nF	
(33 to 110) μF	(10 to 80) Hz	0.29 % + 100 nF	
(110 to 330) μF	Up to 50 Hz	0.28 % + 300 nF	
(0.33 to 1.1) mF	Up to 20 Hz	0.27 % + 1 μF	

Parameter/Equipment	Range	CMC ² (±)	Comments
Electrical Calibration of Thermocouple Devices ³ – Measure and Generate			Fluke 5520A
Type E	(-250 to -100) °C (-100 to -25) °C (-25 to 350) °C (350 to 650) °C (650 to 1000) °C	0.29 °C 0.09 °C 0.08 °C 0.09 °C 0.12 °C	
Type J	(-210 to -100) °C (-100 to -30) °C (-30 to 150) °C (150 to 760) °C (760 to 1200) °C	0.16 °C 0.09 °C 0.08 °C 0.10 °C 0.14 °C	
Type K	(-200 to -100) °C (-100 to -25) °C (-25 to 120) °C (120 to 1000) °C (1000 to 1372) °C	0.19 °C 0.11 °C 0.09 °C 0.15 °C 0.23 °C	
Type N	(-200 to -100) °C (-100 to -25) °C (-25 to 120) °C (120 to 410) °C (410 to 1300) °C	0.23 °C 0.13 °C 0.12 °C 0.11 °C 0.16 °C	
Type R	(0 to 250) °C (250 to 400) °C (400 to 1000) °C (1000 to 1767) °C	0.37 °C 0.22 °C 0.20 °C 0.30 °C	
Type S	(0 to 250) °C (250 to 1000) °C (1000 to 1400) °C (1400 to 1767) °C	0.36 °C 0.23 °C 0.22 °C 0.23 °C	
Type T	(-250 to -150) °C (-150 to 0) °C (0 to 120) °C (120 to 400) °C	0.37 °C 0.14 °C 0.09 °C 0.08 °C	

Parameter/Equipment	Range	CMC ^{2,4} (±)	Comments
Electrical Calibration of RTD Indicators and Indicating Systems ³ – Generate			
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	0.03 °C 0.04 °C 0.05 °C 0.06 °C 0.09 °C 0.08 °C 0.16 °C	Fluke 5520A
Oscilloscope –			
DC Signal Output			
50 Ω Load	(-6 to 6) V	0.19 % + 40 μV	Fluke 5520A
1 M Ω Load	(-130 to 130) V	0.04 % + 40 μV	
Square Wave Output			
50 Ω Load	1 mV to 6.6 V _(p-p)	0.19 % + 40 μV	Fluke 5520A
1 M Ω Load	1 mV to 130 V _(p-p)	0.08 % + 40 μV	
Leveled Sine Wave (Into 50 Ω)			
5 mV _(p-p) to 5.5 V _(p-p)	50 kHz reference	1.6 % + 300 μV	
Leveled Sine Flatness (50 kHz Reference)			
5 mV _(p-p) to 5.5 V _(p-p)	50 kHz to 100 MHz (100 to 300) MHz (300 to 600) MHz	1.4 % + 100 μV 1.8 % + 100 μV 3.2 % + 100 μV	
Time Marker (50 Ω Load)	(5 to 2) ns 10 ns (50 to 20) ns 20 ms to 100 ns 5 s to 50 ms	1.9 μs/s 1.9 μs/s 1.9 μs/s 1.9 μs/s 58 μs/s	

Parameter/Range	Frequency	CMC ^{2,5} (±)	Comments
AC Power –			Fluke 6100A
1 > PF < 0.75 (6.4 to 1008) V (0.1 to 21) A	50 Hz	0.022 %	
0.75 > PF < 0.5 (6.4 to 1008) V (0.1 to 21) A	50 Hz	0.022 %	
0.5 > PF < 0.25 (6.4 to 1008) V (0.1 to 21) A	50 Hz	0.023 %	
1 > PF < 0.75 (6.4 to 1008) V (0.1 to 21) A	100 Hz	0.022 %	
0.75 > PF < 0.5 (6.4 to 1008) V (0.1 to 21) A	100 Hz	0.023 %	
0.5 > PF < 0.25 (6.4 to 1008) V (0.1 to 21) A	100 Hz	0.027 %	
1 > PF < 0.75 (6.4 to 1008) V (0.1 to 21) A	200 Hz	0.022 %	
0.75 > PF < 0.5 (6.4 to 1008) V (0.1 to 21) A	200 Hz	0.032 %	
0.5 > PF < 0.25 (6.4 to 1008) V (0.1 to 21) A	200 Hz	0.05 %	

Parameter/Equipment	Range	CMC ^{2,4,5} (±)	Comments
Frequency – Generate	0.01 Hz to 2 MHz	2.0 μHz/Hz + 5 μHz	Fluke 5520

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

- ² Calibration and Measurement Capability (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. Calibration and Measurement Capabilities 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 The measurands stated are generated with the Fluke 5000 series of instruments. This capability is suitable for the calibration of the devices intended to measure the stated measurand in the ranges indicated. CMCs are expressed as either a specific value that covers the full range or as a fraction of the reading plus a fixed floor specification.
- ⁵ In the statement of CMC, the value is defined as the percentage of the reading unless otherwise indicated.
- ⁶ The measurands stated are measured with the Fluke 8508A. This capability is suitable for the calibration of the devices intended to generate the measurand in the ranges indicated. CMCs 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.



The American Association for Laboratory Accreditation

World Class Accreditation

Accredited Laboratory

A2LA has accredited

CANADIAN INSTRUMENTATION SERVICES GROUP LTD.

Peterborough, 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 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 8 January 2009*).



Presented this 21st day of September 2010.



Peter M. Meyer

President & CEO
For the Accreditation Council
Certificate Number 3023.01
Valid to May 31, 2012

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