



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

INTEGRITY CALIBRATION SERVICES, INC.
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CALIBRATION

Valid To: October 31, 2019

Certificate Number: 2358.01

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/Range	Frequency	CMC ^{2, 5} (±)	Comments
AC Current – Generate ³			
(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	0.23 % + 110 nA 0.18 % + 110 nA 0.15 % + 110 nA 0.35 % + 160 nA 0.93 % + 210 nA 1.9 % + 410 nA	Fluke 5502A
(0.33 to 3.29999) 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	0.23 % + 160 nA 0.15 % + 160 nA 0.12 % + 160 nA 0.23 % + 210 nA 0.58 % + 310 nA 1.2 % + 610 nA	
(3.3 to 32.9999) 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	0.21 % + 2.1 µA 0.11 % + 2.1 µA 0.047 % + 2.1 µA 0.093 % + 2.1 µA 0.24 % + 3.1 µA 0.47 % + 4.1 µA	

Parameter/Range	Frequency	CMC ^{2,5} (±)	Comments
AC Current – Generate ³ (cont)			
(33 to 329.999) 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	0.21 % + 21 µA 0.11 % + 21 µA 0.047 % + 21 µA 0.12 % + 51 µA 0.24 % + 100 µA 0.47 % + 200 µA	Fluke 5502A
(0.33 to 1.09999) A	(10 to 45) Hz 45 Hz to 1 kHz (1 to 5) kHz (5 to 10) kHz	0.21 % + 110 µA 0.058 % + 110 µA 0.7 % + 1 mA 2.9 % + 5 mA	
(1.1 to 2.99999) A	(10 to 45) Hz 45 Hz to 1 kHz (1 to 5) kHz (5 to 10) kHz	0.21 % + 110 µA 0.07 % + 110 µA 0.69 % + 1.0 mA 2.9 % + 5.0 mA	
(3 to 10.9999) A	(45 to 100) Hz 100 Hz to 1 kHz (1 to 5) kHz	0.07 % + 2.1 mA 0.12 % + 2.1 mA 3.5 % + 2.1 mA	
(11 to 20.5) A	(45 to 100) Hz 100 Hz to 1 kHz (1 to 5) kHz	0.14 % + 5.1 mA 0.18 % + 5.1 mA 3.5 % + 5.1 mA	
Toroidal /Non- Toroidal			
(16.5 to 1025) A	(45 to 100) Hz (100 to 440) Hz	1.2 % + 1 A 1.7 % + 1.2 A	Fluke 5502A w/50:1 coil

Parameter/Range	Frequency	CMC ^{2,4} (±)	Comments
AC Current – Measure ³			
Up to 200 µA	10 Hz to 10 kHz (10 to 30) kHz (30 to 100) kHz	0.058 % + 20 nA 0.082 % + 20 nA 0.47 % + 20 nA	Fluke 8508A
200 µA to 2 mA	10 Hz to 10 kHz (10 to 30) kHz (30 to 100) kHz	0.035 % + 200 nA 0.082 % + 200 nA 0.47 % + 200 nA	
(2 to 20) mA	10 Hz to 10 kHz (10 to 30) kHz (30 to 100) kHz	0.035 % + 2 µA 0.082 % + 2 µA 0.47 % + 2 µA	
(20 to 200) mA	10 Hz to 10 kHz (10 to 30) kHz	0.034 % + 20 µA 0.073 % + 20 µA	
200 mA to 2 A	10 Hz to 2 kHz (2 to 10) kHz (10 to 30) kHz	0.072 % + 200 µA 0.085 % + 200 µA 0.35 % + 200 µA	
(2 to 20) A	10 Hz to 2 kHz (2 to 10) kHz	0.095 % + 2 mA 0.29 % + 2 mA	

Parameter/Range	Frequency	CMC ^{2,4} (\pm)	Comments
AC Voltage – Measure ³			
Up to 200 mV	(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 % + 4.1 μ V 0.014 % + 4.1 μ V 0.014 % + 2.1 μ V 0.016 % + 4.1 μ V 0.04 % + 8.1 μ V 0.089 % + 20 μ V	Fluke 8508A
200 mV to 2 V	(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	0.014 % + 21 μ V 0.011 % + 21 μ V 0.010 % + 21 μ V 0.013 % + 21 μ V 0.026 % + 41 μ V 0.066 % + 200 μ V 0.35 % + 2 mV 1.2 % + 20 mV	
(2 to 20) V	(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	0.014 % + 210 μ V 0.011 % + 210 μ V 0.009 % + 210 μ V 0.013 % + 210 μ V 0.026 % + 410 μ V 0.066 % + 2 mV 0.35 % + 20 mV 1.2 % + 200 mV	
(20 to 200) V	(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	0.014 % + 2.1 mV 0.011 % + 2.1 mV 92 μ V/V + 2.1 mV 0.013 % + 2.1 mV 0.026 % + 4.1 mV 0.066 % + 20 mV 0.35 % + 200 mV 1.2 % + 2 V	
(200 to 1050) V	(10 to 40) Hz 40 Hz to 10 kHz (10 to 30) kHz (30 to 100) kHz	0.019 % + 21 mV 0.014 % + 21 mV 0.027 % + 41 mV 0.067 % + 200 mV	

Parameter/Range	Frequency	CMC ^{2,5} (\pm)	Comments
AC Voltage – Generate ³			
(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	0.18 % + 21 μ V 0.12 % + 21 μ V 0.18 % + 21 μ V 0.23 % + 21 μ V 0.41 % + 34 μ V 1.2 % + 61 μ V	Fluke 5502A
(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	0.058 % + 21 μ V 0.035 % + 21 μ V 0.081 % + 21 μ V 0.12 % + 41 μ V 0.27 % + 170 μ V 0.58 % + 330 μ V	
(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	0.058 % + 67 μ V 0.035 % + 67 μ V 0.081 % + 67 μ V 0.12 % + 67 μ V 0.27 % + 210 μ V 0.58 % + 910 μ V	
(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	0.058 % + 870 μ V 0.035 % + 670 μ V 0.081 % + 670 μ V 0.12 % + 670 μ V 0.27 % + 2.1 mV	
(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	0.058 % + 3.7 mV 0.093 % + 9.7 mV 0.11 % + 9.7 mV 0.14 % + 9.7 mV 0.28 % + 81 mV	
(330 to 1020) V	45 Hz to 1 kHz (1 to 5) kHz (5 to 10) kHz	0.058 % + 27 mV 0.093 % + 27 mV 0.11 % + 27 mV	

Parameter/Equipment	Range	CMC ^{2,4,5} (±)	Comments
DC Voltage – Generate ³	Up to 329.9999 mV 330 mV to 3.299999 V (3.3 to 32.99999) V (33 to 329.9999) V (330 to 1020) V	0.007 % + 3.1 μV 0.006 % + 6.2 μV 0.006 % + 62 μV 0.007 % + 0.62 mV 0.007 % + 2.7 mV	Fluke 5502A
DC Current – Generate ³	Up to 329.999 μA 330 μA to 3.29999 mA (3.3 to 32.9999) mA (33 to 329.999) mA 330 mA to 1.09999 A (1.1 to 2.99999) A (3 to 10.9999) A (11 to 20.5) A	0.018 % + 21 nA 0.012 % + 57 nA 0.012 % + 320 nA 0.012 % + 3.2 μA 0.044 % + 51 μA 0.044 % + 56 μA 0.07 % + 570 μA 0.12 % + 870 μA	Fluke 5502A
Toroidal/ Non-Toroidal	(16.5 to 1025) A	0.59 % + 0.54 A	Fluke 5502A w/50:1 coil
DC Voltage – Measure ³	Up to 200 mV 200 mV to 2 V (2 to 20) V (20 to 200) V (200 to 1050) V	0.0009 % + 0.1 μV 0.0008 % + 0.4 μV 0.0008 % + 4 μV 0.0009 % + 40 μV 0.001 % + 0.5 mV	Fluke 8508A
Capacitance – Generate ³	(0.22 to 1.0999) nF (1.1 to 3.299) nF (3.3 to 10.999) nF (11 to 32.999) nF (33 to 109.999) 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 (0.33 to 1.0999) mF (1.1 to 3.2999) mF (3.3 to 10.999) mF (11 to 32.999) mF (33 to 110.0) mF	0.59 % + 11 pF 0.59 % + 16 pF 0.30 % + 16 pF 0.30 % + 160 pF 0.30 % + 170 pF 0.30 % + 910 pF 0.30 % + 1.7 nF 0.30 % + 9.1 nF 0.30 % + 17 nF 0.47 % + 91 nF 0.53 % + 170 nF 0.53 % + 910 nF 0.53 % + 1.7 μF 0.53 % + 9.1 μF 0.53 % + 17 μF 0.87 % + 91 μF 1.3 % + 220 μF	Fluke 5502A

Parameter/Equipment	Range	CMC ^{2,4,5} (±)	Comments
DC Current – Measure ³	Up to 200 μ A 200 μ A to 2 mA (2 to 20) mA (20 to 200) mA 200 mA to 2 A (2 to 20) A	0.0018 % + 410 pA 0.0018 % + 4.1 nA 0.0025 % + 41 nA 0.0062 % + 810 nA 0.019 % + 16 μ A 0.047 % + 0.41 mA	Fluke 8508A
Resistance – Generate ³	Up to 10.999 Ω (11 to 32.999) Ω (33 to 109.999) Ω (110 to 329.999) 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 329.999) M Ω (330 to 1100) M Ω	0.015 % + 1.6 m Ω 0.014 % + 2.2 m Ω 0.011 % + 2.1 m Ω 0.011 % + 3.2 m Ω 0.011 % + 8.6 m Ω 0.011 % + 32 m Ω 0.011 % + 86 m Ω 0.011 % + 0.32 Ω 0.013 % + 0.86 Ω 0.014 % + 3.2 Ω 0.018 % + 8.6 Ω 0.018 % + 42 Ω 0.07 % + 120 Ω 0.12 % + 2.7 k Ω 0.58 % + 3.7 k Ω 0.58 % + 110 k Ω 1.8 % + 0.51 M Ω	Fluke 5502A
Resistance – Measure ³	Up to 2 Ω (2 to 20) Ω (20 to 200) Ω 200 Ω to 2 k Ω (2 to 20) k Ω (20 to 200) k Ω 200 k Ω to 2 M Ω (2 to 20) M Ω (20 to 200) M Ω 200 M Ω to 2 G Ω (2 to 20) G Ω	0.0055 % + 4 μ Ω 0.0052 % + 14 μ Ω 0.002 % + 51 μ Ω 0.001 % + 510 μ Ω 0.0014 % + 5.1 m Ω 0.001 % + 51 m Ω 0.022 % + 1 Ω 0.0024 % + 10 Ω 0.023 % + 1 k Ω 0.068 % + 0.1 M Ω 0.19 % + 10 M Ω	Fluke 8508A
RTD – Measure ³	Up to 199.99 Ω (200 to 1999.9) Ω	0.0052 % + 0.15 m Ω 0.001 % + 0.57 m Ω	Fluke 8508A

Parameter/Equipment	Range	CMC ² (±)	Comments
Electrical Calibration of RTD Indicating Systems ³ –			
Pt 385, 100 Ω	(-200 to 0) °C (0 to 100) °C (100 to 300) °C (300 to 630) °C (630 to 800) °C	0.07 °C 0.09 °C 0.12 °C 0.15 °C 0.27 °C	Fluke 5502A
Pt 3926, 100 Ω	(-80 to 630) °C	0.18 °C	
Pt 385, 1000 Ω	(-200 to 600) °C	0.13 °C	
Ni 385, 120 Ω	(-80 to 260) °C	0.19 °C	
Cu 427, 10 Ω	(-100 to 260) °C	0.36 °C	
Electrical Calibration of Thermocouples & Thermocouple Indicating Systems ³ –			
Type B	(250 to <350) °C (350 to <445) °C (445 to <580) °C (580 to <750) °C (750 to <1000) °C (1000 to 1820) °C	1.3 °C 0.99 °C 0.84 °C 0.73 °C 0.66 °C 0.61 °C	Ectron 1140A

Parameter/Equipment	Range	CMC ² (±)	Comments
Electrical Calibration of Thermocouples & Thermocouple Indicating Systems ³ – (cont)			
Type C	(0 to <250) °C (250 to <1000) °C (1000 to <1500) °C (1500 to <1800) °C (1800 to <2000) °C (2000 to <2250) °C (2250 to 2315.56) °C	0.55 °C 0.54 °C 0.55 °C 0.56 °C 0.57 °C 0.61 °C 0.63 °C	Ectron 1140A
Type E	(-270 to <-245) °C (-245 to <-195) °C (-195 to <-155) °C (-155 to <-90) °C (-90 to <15) °C (15 to <890) °C (890 to 1000) °C	1.4 °C 0.22 °C 0.13 °C 0.11 °C 0.094 °C 0.077 °C 0.09 °C	
Type J	(-210 to <-180) °C (-180 to <-120) °C (-120 to <-50) °C (-50 to <990) °C (990 to 1200) °C	0.15 °C 0.13 °C 0.11 °C 0.096 °C 0.092 °C	
Type K	(-270 to <-255) °C (-255 to <-195) °C (-195 to <-115) °C (-115 to <-55) °C (-55 to <1000) °C (1000 to 1372) °C	2.6 °C 0.82 °C 0.16 °C 0.13 °C 0.098 °C 0.14 °C	
Type N	(-270 to <-260) °C (-260 to <-200) °C (-200 to <-140) °C (-140 to <-70) °C (-70 to <25) °C (25 to <160) °C (160 to 1300) °C	5.8 °C 1.2 °C 0.29 °C 0.21 °C 0.18 °C 0.16 °C 0.14 °C	

Parameter/Equipment	Range	CMC ² (±)	Comments
Electrical Calibration of Thermocouples & Thermocouple Indicating Systems ³ – (cont)			
Type R	(-50 to <-30) °C (-30 to <45) °C (45 to <160) °C (160 to <380) °C (380 to <775) °C (775 to 1768.1) °C	0.91 °C 0.81 °C 0.69 °C 0.41 °C 0.35 °C 0.32 °C	Ectron 1140A
Type S	(-50 to <-30) °C (-30 to <45) °C (45 to <105) °C (105 to <310) °C (310 to <615) °C (615 to 1768.1) °C	0.83 °C 0.78 °C 0.63 °C 0.57 °C 0.42 °C 0.39 °C	
Type T	(-270 to <-255) °C (-255 to <-240) °C (-240 to <-210) °C (-210 to <-150) °C (-150 to <-40) °C (-40 to <100) °C (100 to 400) °C	2.1 °C 0.59 °C 0.37 °C 0.25 °C 0.19 °C 0.14 °C 0.13 °C	

II. Thermodynamics

Parameter/Equipment	Range	CMC ² (±)	Comments
Temperature – Measuring Equipment & Measure ³	(-30 °C to 100) °C	0.08 °C	Hart 5626, Fluke 8508A, Hart 7103 fluid bath
	(100 to 425) °C (425 to 650) °C	0.07 °C 0.09 °C	Hart 5626, Fluke 8508A, Hart 9173 metrology well
	(650 to 1000) °C (1000 to 1100) °C (1100 to 1200) °C	1.2 °C 1.3 °C 1.6 °C	Hart 5650 type S reference standard, Fluke 8508A, furnace
	Infrared	(50 to 500) °C	1.3 °C + 1 % rdg

Parameter/Equipment	Range	CMC ² (±)	Comments
Relative Humidity – Measuring Equipment, Fixed Points ³	11 % RH 33 % RH 75 % RH 97 % RH	2.6 % RH 2.7 % RH 2.9 % RH 3.8 % RH	Saturated salts
Relative Humidity – Measure ³	(10 to 95) % RH	1.9 % RH	Vaisala HMI41 & HMP46

III. Time & Frequency

Parameter/Range	Frequency	CMC ^{2,4,5} (±)	Comments
Frequency – Measuring Equipment ³	10 Hz to 10 kHz 10 kHz to 2 MHz	0.0018 % + 7 mHz 0.014 % + 620 mHz	Fluke 5502A
Frequency – Measure ³	1 Hz to 225 MHz	2.4 µHz/Hz + 30 µHz	Agilent 53132A

¹ This laboratory offers commercial calibration 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 The measurands stated are measured with the Fluke 8408A. 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/percent of the reading/output plus a range specification.

⁵ The measurands stated are generated with the Fluke 5502A 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/percent of the reading plus a fixed floor specification.



Accredited Laboratory

A2LA has accredited

INTEGRITY CALIBRATION SERVICES, INC.

Evansville, IN

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 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 17th day of August 2017.

A handwritten signature in black ink, written over a horizontal line.

President and CEO
For the Accreditation Council
Certificate Number 2358.01
Valid to October 31, 2019

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