SCOPE OF ACCREDITATION TO ISO/IEC 17025:2017

THERMO ELECTRON NORTH AMERICA LLC operating as UNITY LAB SERVICES[8]
4835 Decatur Blvd, Suite D
Indianapolis, IN, 46241
Martin Legault phone: 613-796-1394

CALIBRATION

Valid to: December 31, 2025 Certificate Number: 6843.01

In recognition of the successful completion of the A2LA evaluation process (including an assessment of the organization's compliance with R205 – A2LA's Calibration Program Requirements), accreditation is granted to this laboratory to perform the following calibrations[1, 7, 8]:

I. Chemical Quantities

Parameter/Equipment	Range	CMC[2, 4] (±)	Comments
CO_2 – Measuring Equipment	3 % CO_2 7 % CO_2 9 % CO_2	0.025 % CO_2 0.048 % CO_2 0.053 % CO_2	Certified CO_2 gas
CO_2 – Measuring Equipment[3]	Up to 20 % CO_2	1.0 % CO_2	Certified gas analyzer
O_2 – Measuring Equipment	1 % O_2 6 % O_2 20.8 % O_2	0.017 % O_2 0.066 % O_2 0.034 % O_2	Certified O_2 gas

II. Electrical – DC/Low Frequency

Parameter/Range	Frequency	CMC[2, 5, 6] (±)	Comments
AC Volts – Generate			
(1.0 to 32.999) mV	(10 to 45) Hz (0.045 to 10) kHz (10 to 20) kHz (20 to 50) kHz (50 to 100) kHz (100 to 500) kHz	0.080 % + 6 µV 0.015 % + 6 µV 0.020 % + 6 µV 0.10 % + 6 µV 0.35 % + 12 µV 0.80 % + 50 µV	Fluke 5522A
AC Volts – Generate			
(33 to 329.999) mV	(10 to 45) Hz (0.045 to 10) kHz (10 to 20) kHz (20 to 50) kHz (50 to 100) kHz (100 to 500) kHz	0.030 % + 8 µV 0.015 % + 8 µV 0.016 % + 8 µV 0.035 % + 8 µV 0.080 % + 32 µV 0.20 % + 70 µV	Fluke 5522A
(0.33 to 3.299 99) V	(10 to 45) Hz (0.045 to 10) kHz (10 to 20) kHz (20 to 50) kHz (50 to 100) kHz	0.030 % + 50 µV 0.015 % + 60 µV 0.019 % + 60 µV 0.030 % + 50 µV 0.070 % + 130 µV	
(3.3 to 32.9999) V	(10 to 45) Hz (45 to 10) kHz (10 to 20) kHz (20 to 50) kHz (50 to 100) kHz	0.030 % + 0.65 mV 0.015 % + 0.60 mV 0.024 % + 0.60 mV 0.035 % + 0.60 mV 0.090 % + 1.6 mV	
(33 to 329.999)	(45 to 1000) Hz (1 to 10) kHz (10 to 20) kHz (20 to 50) kHz (50 to 100) kHz	0.019 % + 2.0 mV 0.020 % + 6.0 mV 0.025 % + 6.0 mV 0.030 % + 6.0 mV 0.20 % + 50 mV	
(300 to 1020) V	(45 to 1000) Hz (1 to 5) kHz (5 to 10) kHz	0.030 % + 10 mV 0.025 % + 10 mV 0.030 % + 10 mV	

Parameter/Range	Frequency	CMC[2, 5, 6] (±)	Comments
AC Volts – Measure			
(0 to 100) mV	(3 to 5) Hz (5 to 10) Hz (0.01 to 20) kHz (20 to 50) kHz (50 to 100) kHz (100 to 300) kHz	1.0 % + 0.04 mV 0.35 % + 0.04 mV 0.06 % + 0.04 mV 0.12 % + 0.05 mV 0.6 % + 0.08 mV 4.0 % + 0.05 mV	Fluke 8846A
(0.1 to 1) V	(3 to 5) Hz (5 to 10) Hz (0.01 to 20) kHz (20 to 50) kHz (50 to 100) kHz (100 to 300) kHz	1.0 % + 0.0003 V 0.35 % + 0.0003 V 0.06 % + 0.0003 V 0.12 % + 0.0005 V 0.60 % + 0.0008 V 4.0 % + 0.005 V	
(1 to 10) V	(3 to 5) Hz (5 to 10) Hz (0.01 to 20) kHz (20 to 50) kHz (50 to 100) kHz (100 to 300) kHz	1.0 % + 0.003 V 0.35 % + 0.003 V 0.06 % + 0.003 V 0.12 % + 0.005 V 0.60 % + 0.008 V 4.0 % + 0.05 V	
(10 to 100) V	(3 to 5) Hz (5 to 10) Hz (0.01 to 20) kHz (20 to 50) kHz (50 to 100) kHz (100 to 300) kHz	1.0 % + 0.03 V 0.35 % + 0.03 V 0.06 % + 0.03 V 0.12 % + 0.05 V 0.60 % + 0.08 V 4.0 % + 0.5 V	
(100 to 1000) V	(3 to 5) Hz (5 to 10) Hz (0.01 to 20) kHz (20 to 50) kHz (50 to 100) kHz (100 to 300) kHz	1.0 % + 0.23 V 0.35 % + 0.23 V 0.06 % + 0.23 V 0.12 % + 0.38 V 0.6 % + 0.6 V 4.0 % + 3.8 V	

Parameter/Equipment	Range	CMC[2, 5, 6] (±)	Comments
DC Voltage – Generate	(0 to 329.9999) mV (0.329 to 3.299 999) V (3.29 to 32.999 99) V (32.9 to 329.9999) V (329 to 1020.000) V	0.0023 % + 2.0 µV 0.0013 % + 3.5 µV 0.0014 % + 35 µV 0.0021 % + 250 µV 0.0021 % + 1.8 mV	Fluke 5522A

Parameter/Equipment	Range	CMC[2, 5, 6] (±)	Comments
DC Volts – Measure	(0 to 100) mV (0.001 to 1) V (1 to 10) V (10 to 100) V (100 to 1000) V	0.0037 % + 0.0035 mV 0.0025 % + 0.000 007 V 0.0024 % + 0.000 05 V 0.0038 % + 0.0006 V 0.0041 % + 0.01 V	Fluke 8846A
Resistance – Generate	(0 to 10.9999) Ω (11 to 32.9999) Ω (33 to 109.9999) Ω (110 to 329.9999) Ω (0.33 to 1.099 999) kΩ (1.1 to 3.299 999) kΩ (3.3 to 10.999 99) kΩ (11 to 32.999 99) kΩ (33 to 109.9999) kΩ (110 to 329.999 99) kΩ (0.33 to 1.099 999) MΩ (1.1 to 3.299 99) MΩ (3.3 to 10.999 99) MΩ (11 to 32.999 99) MΩ (33 to 109.9999) MΩ (110 to 329.9999) MΩ (330 to 1100) MΩ	0.0040 % + 0.01 Ω 0.0030 % + 0.015 Ω 0.0028 % + 0.015 Ω 0.0028 % + 0.02 Ω 0.0028 % + 0.02 Ω 0.0028 % + 0.20 Ω 0.0028 % + 0.1 Ω 0.0028 % + 1.0 Ω 0.0028 % + 1.0 Ω 0.0032 % + 10 Ω 0.0032 % + 10 Ω 0.0060 % + 150 Ω 0.013 % + 250 Ω 0.025 % + 2.5 kΩ 0.050 % + 3.0 kΩ 0.30 % + 100 kΩ 1.5 % + 500 kΩ	Fluke 5522A
Resistance – Measure	(0 to 10) Ω (10 to 100) Ω (0.1 to 1) kΩ (1 to 10) kΩ (10 to 100) kΩ (0.1 to 1) MΩ (1 to 10) MΩ (10 to 100) MΩ (0.1 to 1) GΩ	0.01 % + 0.003 Ω 0.01 % + 0.004 Ω 0.01 % + 0.000 01 kΩ 0.01 % + 0.0001 kΩ 0.01 % + 0.001 kΩ 0.01 % + 0.000 01 MΩ 0.04 % + 0.0001 MΩ 0.8 % + 0.01 MΩ 2.0 % + 0.0001 GΩ	Fluke 8846A

Parameter/Range	Frequency	CMC[2, 5, 6] (±)	Comments
AC Current – Generate			
(29.00 to 329.99) µA	(10 to 20) Hz (20 to 45) Hz (0.045 to 1) kHz (1 to 5) kHz (5 to 10) kHz (10 to 30) kHz	0.20 % + 0.10 µA 0.15 % + 0.10 µA 0.13 % + 0.10 µA 0.30 % + 0.15 µA 0.80 % + 0.20 µA 1.6 % + 0.40 µA	Fluke 5522A
(0.33 to 3.299 99) mA	(10 to 20) Hz (20 to 45) Hz (0.045 to 1) kHz (1 to 5) kHz (5 to 10) kHz (10 to 30) kHz	0.20 % + 0.15 µA 0.13 % + 0.15 µA 0.10 % + 0.15 µA 0.20 % + 0.20 µA 0.50 % + 0.30 µA 1.0 % + 0.60 µA	
(3.3 to 32.9999) mA	(10 to 20) Hz (20 to 45) Hz (0.045 to 1) kHz (1 to 5) kHz (5 to 10) kHz (10 to 30) kHz	0.16 % + 2.0 µA 0.09 % + 2.0 µA 0.04 % + 2.0 µA 0.08 % + 2.0 µA 0.20 % + 3.0 µA 0.40 % + 4.0 µA	
(33 to 329.999) mA	(10 to 20) Hz (20 to 45) Hz (0.045 to 1) kHz (1 to 5) kHz (5 to 10) kHz (10 to 30) kHz	0.10 % + 20 µA 0.090 % + 20 µA 0.040 % + 20 µA 0.10 % + 50 µA 0.20 % + 100 µA 0.40 % + 200 µA	
(0.33 o 1.099 99) A	(10 to 45) Hz (0.045 to 1) kHz (1 to 5) kHz (5 to 10) kHz	0.18 % + 0.10 mA 0.050 % + 0.10 mA 0.60 % + 1.0 mA 2.5 % + 5.0 mA	
(1.1 to 2.999 99) A	(10 to 45) Hz (0.045 to 1) kHz (1 to 5) kHz (5 to 10) kHz	0.18 % + 0.10 mA 0.060 % + 0.10 mA 0.60 % + 1.0 mA 2.5 % + 5.0 mA	
(3 to 10.9999) A	(45 to 100) Hz (0.1 to 1) kHz (1 to 5) kHz	0.060 % + 2.0 mA 0.10 % + 2.0 mA 3.0 % + 2.0 mA	
(11 to 20.5) A	(45 to 100) Hz (0.1 to 1) kHz (1 to 5) kHz	0.12 % + 5.0 mA 0.15 % + 5.0 mA 3.0 % + 5.0 mA	

Parameter/Range	Frequency	CMC[2, 5, 6] (±)	Comments
AC Current – Measure			
(0 to 100) µA	(3 to 5) Hz (5 to 10) Hz (0.01 to 5) kHz (5 to 10) kHz	1.0 % + 0.06 µA 0.35 % + 0.06 µA 0.15 % + 0.06 µA 0.35 % + 0.70 µA	Fluke 8846A
(0.1 to 1) mA	(3 to 5) Hz (5 to 10) Hz (0.01 to 5) kHz (5 to 10) kHz	1.0 % + 0.0004 mA 0.3 % + 0.0004 mA 0.1 % + 0.0004 mA 0.2 % + 0.0025 mA	
(1 to 10) mA	(3 to 5) Hz (5 to 10) Hz (0.01 to 5) kHz (5 to 10) kHz	1.1 % + 0.006 mA 0.35 % + 0.006 mA 0.15 % + 0.006 mA 0.35 % + 0.07 mA	
(10 to 100) mA	(3 to 5) Hz (5 to 10) Hz (0.01 to 5) kHz (5 to 10) kHz	1.0 % + 0.04 mA 0.3 % + 0.4 mA 0.1 % + 0.4 mA 0.2 % + 0.25 mA	
(100 to 400) mA	(3 to 5) Hz (5 to 10) Hz (0.01 to 5) kHz (5 to 10) kHz	1.0 % + 0.4 mA 0.3 % + 0.4 mA 0.1 % + 0.4 mA 0.2 % + 2.8 mA	
(0.4 to 1) A	(3 to 5) Hz (5 to 10) Hz (0.01 to 5) kHz (5 to 10) kHz	1.0 % + 0.0004 A 0.3 % + 0.0004 A 0.1 % + 0.0004 A 0.35 % + 0.007 A	
(1 to 3) A	(3 to 5) Hz (5 to 10) Hz (0.01 to 5) kHz (5 to 10) kHz	1.1 % + 0.0018 A 0.35 % + 0.0018 A 0.15 % + 0.0018 A 0.35 % + 0.021 A	
(3 to 10) A	(3 to 5) Hz (5 to 10) Hz (0.01 to 5) kHz (5 to 10) kHz	1.1 % + 0.006 A 0.35 % + 0.006 A 0.15 % + 0.006 A 0.35 % + 0.07 A	

Parameter/Equipment	Range	CMC[2, 5, 6] (±)	Comments
DC Current – Generate	(0 to 329.999) µA (0.3 to 3.299 99) mA (3.3 to 32.9999) mA (33 to 329.999) mA (0.3 to 1.099 99) A (1.1 to 2.999 99) A (3 to 10.9999) A (11 to 20.5) A	0.015 % + 0.020 µA 0.010 % + 0.05 µA 0.010 % + 0.25 µA 0.010 % + 2.5 µA 0.020 % + 40 µA 0.038 % + 40 µA 0.050 % + 500 µA 0.10 % + 750 µA	Fluke 5522A
DC Current – Measure	(0 to 100) µA (0.1 to 1) mA (1 to 10) mA (10 to 100) mA (100 to 400) mA (0.4 to 1) A (1 to 3) A (3 to 10) A	0.05 % + 0.025 µA 0.05 % + 0.000 05 mA 0.05 % + 0.002 mA 0.05 % + 0.005 mA 0.05 % + 0.02 mA 0.05 % + 0.0002 A 0.1 % + 0.0006 A 0.15 % + 0.0008 A	Fluke 8846A
Capacitance – Generate	(220 to 339.9) pF (0.4 to 1.0999) nF (1.1 to 3.2999) nF (3.3 to 10.9999) nF (11 to 32.9999) nF (33 to 109.999) nF (110 to 329.999) nF (0.33 to 1.099 99) µF (1.1 to 3.299 99) µF (3.3 to 10.9999) µF (11 to 32.9999) µF (33 to 109.999) µF (110 to 329.999) µF (0.33 to 1.099 99) mF (1.1 to 3.299 99) mF (3.3 to 10.9999) mF (11 to 32.9999) mF (33 to 110) mF	0.50 % + 10 pF 0.50 % + 0.01 nF 0.50 % + 0.01 nF 0.25 % + 0.01 nF 0.25 % + 0.01 nF 0.25 % + 0.01 nF 0.25 % + 0.03 nF 0.25 % + 1.0 nF 0.25 % + 3.0 nF 0.25 % + 10 nF 0.40 % + 30 nF 0.45 % + 100 nF 0.45 % + 300 nF 0.45 % + 1.0 µF 0.45 % + 3.0 µF 0.45 % + 10 µF 0.75 % + 30 µF 1.1 % + 100 µF	Fluke 5522A

Parameter/Equipment	Range	CMC[2, 5, 6] (±)	Comments
Capacitance – Measure	(0 to 1) nF (1 to 10) nF (10 to 100) nF (0.1 to 1) µF (1 to 10) µF (10 to 100) µF (0.1 to 1) mF (1 to 10) mF (10 to 100) mF	2.0 % + 0.025 nF 1.0 % + 0.05 nF 1.0 % + 0.5 nF 1.0 % + 0.005 µF 1.0 % + 0.05 µF 1.0 % + 0.5 µF 1.0 % + 0.005 mF 1.0 % + 0.05 mF 4.0 % + 0.2 mF	Fluke 8846A
Thermocouple – Generate			
Type E	(-250 to -100) °C (-100 to -25) °C (-25 to 350) °C (350 to 650) °C (650 to 1000) °C	0.50 °C 0.16 °C 0.14 °C 0.16 °C 0.21 °C	Fluke 5522A
Type J	(-210 to -100) °C (-100 to -30) °C (-30 to 150) °C (150 to 750) °C (760 to 1200) °C	0.27 °C 0.16 °C 0.14 °C 0.17 °C 0.23 °C	
Type K	(-200 to -100) °C (-100 to -25) °C (-25 to 120 °C (120 to 1000) °C (1000 to 1372) °C	0.33 °C 0.18 °C 0.16 °C 0.26 °C 0.40 °C	
Type N	(-200 to -100) °C (-100 to 25) °C (-25 to 120) °C (120 to 410) °C (410 to 1300) °C	0.40 °C 0.22 °C 0.19 °C 0.18 °C 0.27 °C	
Type R	(0 to 250) °C (250 to 400) °C (400 to 1000) °C (1000 to 1767) °C	0.57 °C 0.35 °C 0.33 °C 0.40 °C	
Type S	(0 to 250) °C (250 to 1000) °C (1000 to 1400) °C (1400 to 1767) °C (120 to 400) °C	0.47 °C 0.36 °C 0.37 °C 0.46 °C 0.14 °C	

Parameter/Equipment	Range	CMC[2] (±)	Comments
Thermocouple – Generate (cont)			
Type T	(-250 to -150) °C (-150 to 0) °C (0 to 120) °C (120 to 400) °C	0.63 °C 0.37 °C 0.16 °C 0.14 °C	Fluke 5522A
RTD – 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 640) °C (640 to 800) °C	0.050 °C 0.050 °C 0.070 °C 0.090 °C 0.10 °C 0.12 °C 0.23 °C	Fluke 5522A
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 640) °C	0.050 °C 0.050 °C 0.070 °C 0.090 °C 0.10 °C 0.12 °C	
Pt 3916 – 100 Ω	(-200 to -190) °C (-190 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	0.25 °C 0.040 °C 0.050 °C 0.060 °C 0.070 °C 0.080 °C 0.090 °C 0.10 °C 0.23 °C	
Pt 3985 – 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	0.040 °C 0.040 °C 0.040 °C 0.050 °C 0.12 °C 0.13 °C 0.14 °C 0.16 °C	

III. Mechanical

Parameter/Equipment	Range	CMC[2] (±)	Comments
Centrifuges[3]	(1000 to 15 000) rpm (>15 000 to 80 000) rpm	10 rpm 43 rpm	Optical tachometer

V. Thermodynamics

Parameter/Equipment	Range	CMC[2] (±)	Comments
Temperature – Measure[3]	(-80 to 105) °C (>105 to 150) °C (>150 to 200) °C (>200 to 250) °C (>250 to 300) °C (>300 to 350 °C (>350 to 450) °C (>450 to 1000) °C	0.13 °C 1 °C 2 °C 5 °C 7 °C 10 °C 12 °C 17 °C	Certified thermometers
Thermocouple Thermometer System	-196 °C (-80 to 160) °C (160 to 200) °C (200 to 300) °C (300 to 425) °C (425 to 700) °C (700 to 1200) °C	0.0073 °C 0.018 °C 0.021 °C 0.039 °C 0.30 °C 0.35 °C 0.44 °C	Liquid bath or dry block calibrator
Liquid-in-glass Thermometers (Partial & Total Immersion)	(-80 to 100) °C (100 to 160) °C	0.016 °C 0.029 °C	Liquid temperature bath
Platinum Resistance & Thermistor Thermometer System	-196 °C (-80 to 100) °C (100 to 160) °C (160 to 200) °C (200 to 300) °C (300 to 425) °C (425 to 600) °C	0.0073 °C 0.013 °C 0.019 °C 0.028 °C 0.038 °C 0.29 °C 0.47 °C	Liquid bath or dry block calibrator

Parameter/Equipment	Range	CMC[2, 4] (±)	Comments
Relative Humidity – Hygrometer Systems	(10 to 35) % RH (35 to 65) % RH (65 to 95) % RH 95 % RH	0.23 % RH 0.43 % RH 0.55 % RH 0.76 % RH	Rotronic HyrgoGen H2-S
Relative Humidity – Measure[3]	Up to 95 % RH	2.8 % RH	Reference hygrometer

VI. Time & Frequency

Parameter/Equipment	Range	CMC[2] (±)	Comments
Frequency – Generate (up to 3 V)	(0.01 to 45) Hz (0.045 to 10) kHz (10 to 20) kHz (20 to 50) kHz (50 to 100) kHz (100 to 500) MHz	0.014 Hz 0.0017 kHz 0.0042 kHz 0.016 kHz 0.074 kHz 1.3 kHz	Fluke 5522A internal source
Frequency – Measure[5] (up to 1000 V)	(3 to 5) Hz (5 to 10) Hz (10 to 40) Hz (0.04 to 300) kHz (0.3 to 1) MHz	0.1 % Hz 0.05 % Hz 0.03 % Hz 0.01 % kHz 0.01 % MHz	Fluke 8846A
Timers/Stopwatch	Up to 24 hr	0.013 s/day	Frequency counter
Optical Tachometers	(0 to 1000) RPM (1000 to 10 000) RPM (10 000 to 25 000) RPM (25 000 to 100 000) RPM	0.15 RPM 0.20 RPM 0.65 RPM 1.5 RPM	Function generator & lamp

[1] This laboratory offers commercial calibration services and field calibration services.

[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. 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, percentages are absolute, unless otherwise indicated.

[5] In the statement if CMC, percentages are percentages of reading, unless otherwise indicated.

[6] 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.

[7] This scope meets A2LA's *P112 Flexible Scope Policy*.

[8] Offices for administration of field technicians are located in 28 Schenck Parkway, Suite 400, Ashville, NC, USA

Accredited Laboratory

A2LA has accredited

THERMO ELECTRON NORTH AMERICA LLC operating as UNITY LAB SERVICES

Indianapolis, IN

for technical competence in the field of

Calibration

This laboratory is accredited in accordance with the recognized International Standard ISO/IEC 17025:2017 *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 April 2017*).

Presented this 2nd day of January 2024.

Vice President, Accreditation Services
For the Accreditation Council
Certificate Number 6843.01
Valid to December 31, 2025

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