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

CONTROL AUTOMATION TECHNOLOGIES CORP
101 N Chestnut St.
Winston-Salem, NC 27101
Rob Igoe Phone: 336 725 6020 x 2

CALIBRATION

Valid To: April 30, 2020 Certificate Number: 1486.01

In recognition of the successful completion of the A2LA evaluation process, accreditation is granted to this laboratory to perform the following calibrations[1]:

I. Electrical – DC/Low Frequency

Parameter/Equipment	Range	CMC[2, 3, 4] (±)	Comments
DC Voltage – Generate	Up to 330 mV 330 mV to 3.3 V (3.3 to 33) V (33 to 330) V (100 to 1000) V	24 µV/V + 1 µV 14 µV/V + 2 µV 15 µV/V + 20 µV 22 µV/V + 150 µV 22 µV/V + 1.5 mV	Fluke 5520A
DC Voltage – Measure	(10 to 100) mV (0.1 to 1) V (1 to 10) V (10 to 100) V (100 to 1000) V (1 to 40) kV	11 µV/V + 0.3 µV 10 µV/V + 0.3 µV 10 µV/V + 0.5 µV 12 µV/V + 30 µV 22 µV/V + 100 µV 3.0 % + 10 V	HP 3458A Fluke 80KV-40 probe and HP 3458A
DC Current – Generate	Up to 330 µA 330 µA to 3.3 mA (3.3 to 33) mA (33 to 330) mA 330 mA to 1.1 A (1.1 to 3) A (3 to 11) A (11 to 20.5) A	180 µA/A + 0.02 µA 120 µA/A + 0.05 µA 120 µA/A + 0.25 µA 240 µA/A + 2.5 µA 240 µA/A + 40 µA 440 µA/A + 40 µA 600 µA/A + 500 µA 0.10 % + 0.91 A	Fluke 5520A

Parameter/Equipment	Range	CMC[2, 3, 4] (±)	Comments
DC Current – Generate (cont)	(20.5 to 150) A (150 to 1000) A	0.58 % + 0.16 A 0.60 % + 0.58 A	w/ 10 coil w/ 50 coil
DC Current – Measure	(10 to 100) µA (0.1 to 1) mA (1 to 10) mA (10 to 100) mA (0.1 to 1) A	25 µA/A + 0.8 nA 25 µA/A + 5 nA 25 µA/A + 50 nA 40 µA/A + 0.5 µA 0.012 % + 10 µA	HP 3458A
Resistance – Generate	Up to 10.9999 Ω (11 to 32.9999) Ω (33 to 109.9999) Ω (110 to 329.9999) Ω (0.33 to 1.099999) kΩ (1.1 to 3.299999) kΩ (33 to 10.99999) kΩ (1 to 32.99999) kΩ (33 to 109.999) kΩ (110 to 329.999) kΩ (0.33 to 1.09999) MΩ (1.1 to 3.29900) MΩ (3.3 to 10.9999) MΩ (11 to 32.9999) MΩ (33 to 109.9999) MΩ (110 to 329.9999) MΩ (330 to 1100) MΩ	48 µΩ/Ω + 1.0 mΩ 35 µΩ/Ω + 2.0 mΩ 33 µΩ/Ω + 2.0 mΩ 33 µΩ/Ω + 4.0 mΩ 32 µΩ/Ω + 13 mΩ 32 µΩ/Ω + 13 mΩ 32 µΩ/Ω + 30 mΩ 32 µΩ/Ω + 0.30 Ω 33 µΩ/Ω + 0.30 Ω 37 µΩ/Ω + 2.0 Ω 37 µΩ/Ω + 2.2 Ω 70 µΩ/Ω + 39 Ω 0.016 % + 63 Ω 0.029 % + 2.5 kΩ 0.06 % + 3.0 kΩ 0.4 % + 0.10 MΩ 1.7 % + 0.50 MΩ	Fluke 5520A, 4-wire Fluke 5520A, 2-wire
Resistance – Measure	(0 to 10) Ω (10 to 100) Ω 100 Ω to 100 kΩ 100 kΩ to 1 MΩ (1 to 10) MΩ (10 to 100) MΩ 100 MΩ to 1 GΩ	19 µΩ/Ω + 0.05 mΩ 15 µΩ/Ω + 0.5 mΩ 13 µΩ/Ω + 0.5 mΩ 18 µΩ/Ω + 2 Ω 59 µΩ/Ω + 100 Ω 0.058 % + 1 kΩ 1.8 % + 10 kΩ	HP 3458A
Electrical Calibration of Thermocouple Indicating Devices[3] – Type B Type C Type E Type J	 (600 to 1820) ºC (0 to 2316) ºC (230 to 1000) ºC (-210 to 1200) ºC	 0.52 ºC 0.98 ºC 0.60 ºC 0.50 ºC	 Fluke 5520A

Parameter/Equipment	Range	CMC[2, 3, 4] (±)	Comments
Electrical Calibration of Thermocouple Indicating Devices[3] – (cont)			
Type K	(-200 to 1372) ºC	0.49 ºC	Fluke 5520A
Type T	(-250 to 400) ºC	0.74 ºC	
Type R	(0 to 1767) ºC	0.76 ºC	
Type S	(0 to 1767) ºC	0.63 ºC	

Parameter/Range	Frequency	CMC[2, 3, 4] (±)	Comments
Capacitance – Generate[3]			
(0.19 to 10.9999) nF	(10 to 1000) Hz	0.61 % + 0.01 nF	Fluke 5520A
(11 to 109.999) nF	(10 to 1000) Hz	0.31 % + 0.1 nF	
(110 to 329.999) nF	(10 to 1000) Hz	0.31 % + 0.3 nF	
(0.33 to 1.09999) µF	(10 to 600) Hz	0.31 % + 1 nF	
(1.1 to 3.29999) µF	(10 to 300) Hz	0.31 % + 3 nF	
(3.3 to 10.9999) µF	(10 to 150) Hz	0.31 % + 10 nF	
(11 to 32.9999) µF	(10 to 120) Hz	0.49 % + 30 nF	
(33 to 109.999) µF	(10 to 80) Hz	0.56 % + 100 nF	
(110 to 329.999) µF	(0 to 50) Hz	0.56 % + 300 nF	
330 µF to 10.999 mF	(0 to 2) Hz	0.56 % + 10 µF	
(11 to 32.9999) mF	(0 to 0.60) Hz	0.91 % + 30 µF	
(33 to 110) mF	(0 to 0.20) Hz	2.2 % + 100 µF	

Parameter/Equipment	Range	CMC[2, 3] (±)	Comments
Electrical Calibration of RTD Indicators –			
Pt 385, 100 Ω	(-200 to -80) °C	0.060 °C	Fluke 5520A
	(-80 to 0) °C	0.059 °C	
	(0 to 100) °C	0.083 °C	
	(100 to 300) °C	0.11 °C	
	(300 to 400) °C	0.12 °C	
	(400 to 630) °C	0.12 °C	
	(630 to 800) °C	0.27 °C	

Parameter/Equipment	Range	CMC[2, 3] (±)	Comments
Electrical Calibration of RTD Indicators – (cont)			
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	0.048 °C 0.048 °C 0.048 °C 0.060 °C 0.15 °C 0.16 °C 0.17 °C 0.19 °C	Fluke 5520A
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	0.048 °C 0.060 °C 0.060 °C 0.071 °C 0.095 °C 0.095 °C 0.11 °C 0.13 °C	
Pt 385, 1 kΩ	(-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	0.036 °C 0.036 °C 0.048 °C 0.060 °C 0.071 °C 0.083 °C 0.083 °C 0.28 °C	
PtNi 385, 120 Ω	(-80 to 0) °C (0 to 100) °C (100 to 260) °C	0.095 °C 0.095 °C 0.017 °C	

Parameter/Range	Frequency	CMC[2, 3] (±)	Comments
AC Voltage – Generate			
(1 to 33) 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	950 µV/V + 6 µV 190 µV/V + 6 µV 240 µV/V + 6 µV 1.2 mV/V + 6 µV 4 mV/V + 12 µV 9.3 mV/V + 50 µV	Fluke 5520A

Parameter/Range	Frequency	CMC[2, 3] (±)	Comments
AC Voltage – Generate (cont)			
(33 to 330) mV	(10 to 45) Hz 45 Hz to 10 kHz (10 to 20) kHz (20 to 50) kHz (50 to 100) kHz	350 µV/V + 8 µV 170 µV/V + 8 µV 190 µV/V + 8 µV 410 µV/V + 8 µV 930 µV/V + 32 µV	Fluke 5520A
330 mV to 3.3 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	350 µV/V + 50 µV 180 µV/V + 60 µV 220 µV/V + 60 µV 350 µV/V + 50 µV 810 µV/V + 130 µV 2.8 mV/V + 600 µV	
(3.3 to 33) V	(10 to 45) Hz 45 Hz to 10 kHz (10 to 20) kHz (20 to 50) kHz (50 to 100) kHz	360 µV/V + 650 µV 200 µV/V + 600 µV 470 µV/V + 600 µV 420 µV/V + 600 µV 1 mV/V + 1.6 mV	
(33 to 330) V	45 Hz to 1 kHz (1 to 10) kHz (10 to 20) kHz (20 to 50) kHz (50 to 100) kHz	850 µV/V + 2 mV 850 µV/V + 6 mV 870 µV/V + 6 mV 900 µV/V + 6 mV 2.5 mV/V + 50 mV	
(330 to 1020) V	45 Hz to 10 kHz	8.2 mV/V + 10 mV	
AC Voltage – Measure			
Up 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	0.03 % + 3 µV 0.02 % + 2 µV 0.03 % + 2 µV 0.12 % + 2 µV 0.58 % + 2 µV 4.6 % + 2 µV	HP 3458A, synchronous sub-sampled mode
10 mV to 10 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	80 µV/V + 0.4 mV 80 µV/V + 0.2 mV 0.02 % + 0.2 mV 0.03 % + 0.2 mV 0.09 % + 0.2 mV 0.35 % + 1 mV 1.2 % + 1 mV 1.7 % + 1 mV	

Parameter/Range	Frequency	CMC[2, 3, 4] (±)	Comments
AC Voltage – Measure (cont)			
(10 to 100) V	(1 to 40) Hz 40 Hz to 1 kHz (20 to 50) kHz (50 to 100) kHz (100 to 300) kHz 300 kHz to 1 MHz	0.02 % + 4 mV 0.02 % + 2 mV 0.04 % + 2 mV 0.14 % + 2 mV 0.46 % + 10 mV 1.7 % + 10 mV	HP 3458A, synchronous sub-sampled mode
(100 to 1000) V	(1 to 40) Hz 40 Hz to 1 kHz (1 to 20) kHz	0.05 % + 40 mV 0.05 % + 20 mV 0.07 % + 20 mV	
(1 to 40) kV	60 kHz	6.1 % + 10 V	Fluke 80KV-40 probe and HP 3458A
AC Current – Measure			
Up to 100 µA	(10 to 20) Hz (20 to 45) Hz 45 Hz to 1 kHz	0.46 % + 0.03 µA 0.18 % + 0.03 µA 0.078 % + 0.03 µA	HP 3458A
100 µA to 100 mA	(10 to 20) Hz (20 to 45) Hz (45 to 100) Hz 100 Hz to 5 kHz	0.46 % + 20 µA 0.17 % + 20 µA 0.073 % + 20 µA 0.042 % + 20 µA	
100 mA to 1 A	(10 to 20) Hz (20 to 45) Hz (45 to 100) Hz 100 Hz to 5 kHz	0.46 % + 200 µA 0.19 % + 200 µA 0.10 % + 200 µA 0.12 % + 200 µA	
AC Current – Generate			
(29 to 330) µA 330 µA to 3.3 mA (3.3 to 33) mA (33 mA to 330) mA 330 mA to 1.1 A (1.1 to 3) A (3 to 11) A (11 to 20.5) A	40 Hz to 1 kHz (45 to 100) Hz 100 Hz to 1 kHz (1 to 5) kHz	0.22 % + 0.1 µA 0.13 % + 0.15 µA 0.08 % + 2 µA 0.08 % + 20 µA 0.08 % + 100 µA 0.09 % + 100 µA 0.13 % + 2 mA 0.16 % + 5.1 mA 0.19 % + 5.1 mA 3.5 % + 5.1 mA	Fluke 5520A

Parameter/Range	Frequency	CMC[2, 3, 4] (±)	Comments
AC Current – Generate (cont)			
(20.5 to 150) A (150 to 350) A (20.5 to 150) A (150 to 1000) A	60 Hz (45 to 65) Hz 60 Hz (45 to 65) Hz (65 to 440) Hz (65 to 440) Hz	0.38 % + 0.029 A 1.0 % + 0.031 A 1.0 % + 0.031 A 1.0 % + 0.12 A	Fluke 5520A w/ coil

II. Mechanical

Parameter/Equipment	Range	CMC [2, 4] (±)	Comments
Vacuum	(1 to 30) in·Hg	0.02 %	Pressurements T3550/4P
Pressure –			
Pneumatic	(5 to 400) in·H_2O	0.02 %	Pressurements T3550/4P
Hydraulic	(10 to 10 000) psig	0.02 %	Pressurements W2200/3P

III. Thermodynamic

Parameter/Equipment	Range	CMC[2] (±)	Comments
Temperature – Measure and Measuring Equipment	(-200 to 650) °C	0.024 °C	Hart 5699 and indicator in bath
	(600 to 1200) °C	5.2 °C	Type B TC probe with display
Relative Humidity – Measuring Equipment	(10 to 95) % RH	0.5 % RH	Thunder Scientific two pressure humidity generator

IV. Time & Frequency

Parameter/Equipment	Range	CMC[2] (±)	Comments
Frequency – Measuring Equipment	5 Hz to 10 MHz	0.25 parts in 10^6	Fluke 5520A
Frequency – Measure	5 Hz to 10 MHz	0.25 parts in 10^7	HP 53131A

[1] This laboratory offers commercial 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] The measurands stated are generated using the indicated instrument (see Comments). This capability is suitable for the calibration of the devices intended to measure the measurand in the ranges indicated. CMC's are expressed as either a specific value that covers the full range or as a fraction of the reading plus a fixed floor specification.

[4] In the statement of CMC, the value is defined as the percentage of reading.

Accredited Laboratory

A2LA has accredited

CONTROL AUTOMATION TECHNOLOGIES CORP

Winston-Salem, NC

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 April 2017*).

Presented this 31st day of May 2018.

President and CEO
For the Accreditation Council
Certificate Number 1486.01
Valid to April 30, 2020

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