



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

CONTROL AUTOMATION TECHNOLOGIES CORP
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CALIBRATION

Valid To: April 30, 2020

Certificate Number: 1486.02

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 ^{2,4,5} (±)	Comments
Micrometers	Up to 12 in	(190 + 40L) μin	Grade 0 gage blocks
Calipers	Up to 12 in	(200 + 50L) μin	Grade 0 gage blocks
Dial Indicators	(0.001 to 1) in	330 μin	Grade 0 gage blocks

II. Electrical – DC/Low Frequency

Parameter/Equipment	Range	CMC ^{2,4,5} (±)	Comments
DC Voltage – Generate	Up to 320 mV (0.32 to 3.2) V (3.2 to 32) V (32 to 320) V (0.32 to 1050) V	63 μV/V + 4.2 μV 63 μV/V + 42 μV 74 μV/V + 0.42 mV 73 μV/V + 4.5 mV 62 μV/V + 20 mV	Wavetek 9100

Parameter/Equipment	Range	CMC ^{2, 4, 5} (±)	Comments
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 2.3 % + 10 V	HP 3458A Fluke 80KV-40 probe and HP 3458A
DC Current – Generate	Up 320 μA (0.32 to 3.2) mA (3.2 to 32) mA (32 to 320) mA (0.32 to 3.2) A (3.2 to 10.5) A (10.5 to 20) A 10 Turn Coil (3.2 to 32) A (32 to 105) A (105 to 200) A 50 Turn Coil (16 to 160) A (160 to 525) A (525 to 1000) A	0.016 % + 11 nA 0.016 % + 83 nA 0.016 % + 0.9 μA 0.018 % + 9.6 μA 0.08 % + 120 μA 0.058 % + 0.94 μA 0.058 % + 4.5 mA 0.07 % + 1.2 mA 0.058 % + 9.4 mA 0.058 % + 45 mA 0.07 % + 5.9 mA 0.058 % + 47 mA 0.058 % + 0.23 A	Wavetek 9100
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
Capacitance – Generate	Low (0.5 to 4) nF (4 to 40) nF (40 to 400) nF (0.4 to 4) μF (4 to 40) μF (40 to 400) μF (0.4 to 4) mF (4 to 40) mF High (40 to 400) μF (0.4 to 4) mF (4 to 40) mF	0.4 % + 15 pF 0.4 % + 30 pF 0.4 % + 160 pF 0.6 % + 1.6 nF 0.7 % + 16 nF 0.7 % + 160 nF 0.7 % + 1.6 μF 1.5 % + 60 μF 0.77 % + 160 nF 0.77 % + 1.6 μF 1.3 % + 60 μF	Wavetek 9100



Parameter/Equipment	Range	CMC ^{2, 4, 5} (±)	Comments
DC Resistance – Generate	Up to 40 Ω (40 to 400) Ω (0.4 to 4) kΩ (4 to 40) kΩ (40 to 400) kΩ (0.4 to 4) MΩ (4 to 40) MΩ (40 to 400) MΩ	0.029 % + 10 mΩ 0.024 % + 20 mΩ 0.018 % + 80 mΩ 0.023 % + 800 mΩ 0.025 % + 8 Ω 0.06 % + 100 Ω 0.18 % + 2 kΩ 0.29 % + 40 kΩ	Wavetek 9100
Resistance – Measure	Up 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 + 2.4 Ω 59 μΩ/Ω + 100 Ω 0.058 % + 1.0 kΩ 1.8 % + 10 kΩ	HP 3458A
Electrical Calibration of RTD Indicators – Pt 385, Pt 392 (60 Ω to 2 kΩ) Pt 385, Pt 392 ³ (100 Ω)	 (-200 to -100) °C (-100 to 100) °C (100 to 630) °C (630 to 850) °C (-200 to 800) °C	 0.19 °C 0.14 °C 0.24 °C 0.35 °C 0.52 °C	 Wavetek 9100 Fluke 741B
Electrical Calibration of Thermocouple Indicators – Type J Type K	 (-210 to -100) °C (-100 to 800) °C (800 to 1000) °C (1000 to 1200) °C (-210 to 1200) °C ³ (-250 to -200) °C (-200 to -100) °C (-100 to 100) °C (100 to 600) °C (600 to 1372) °C (-200 to 1372) °C ³	 0.30 °C 0.23 °C 0.26 °C 0.27 °C 0.46 °C 0.59 °C 0.30 °C 0.22 °C 0.25 °C 0.31 °C 0.56 °C	 Wavetek 9100 Fluke 741B Fluke 741B



Parameter/Equipment	Range	CMC ^{2,4,5,6} (±)	Comments
Electrical Calibration of Thermocouple Indicators – (cont)			
Type E	(-250 to -200) °C (-200 to -100) °C (-100 to 100) °C (100 to 1000) °C	0.48 °C 0.27 °C 0.19 °C 0.25 °C	Wavetek 9100
Type T	(-250 to 1000) °C ³ (-250 to -200) °C (-200 to -100) °C (-100 to 0) °C (0 to 400) °C (-250 to 400) °C ³	0.75 °C 0.62 °C 0.29 °C 0.25 °C 0.19 °C 1.1 °C	Fluke 741B Fluke 741B

Parameter/ Range	Frequency	CMC ^{2,4,5} (±)	Comments
AC Voltage – Generate			
Up to 10 mV	10 Hz to 10 kHz (10 to 50) kHz (50 to 100) kHz	0.07 % + 0.51 mV 0.09 % + 1.9 mV 0.25 % + 5.1 mV	Wavetek 9100
(10 to 32) mV	10 Hz to 10 kHz (10 to 50) kHz (50 to 100) kHz	0.06 % + 130 μV 0.09 % + 0.48 mV 0.25 % + 1.3 mV	
(32 to 320) mV	10 Hz to 10 kHz (10 to 50) kHz (50 to 100) kHz	0.06 % + 26 μV 0.09 % + 96 μV 0.25 % + 0.26 mV	
(0.32 to 3.2) V	10 Hz to 10 kHz (10 to 50) kHz (50 to 100) kHz	0.06 % + 0.26 mV 0.09 % + 0.9 mV 0.25 % + 2.6 mV	
(3.2 to 32) V	10 Hz to 10 kHz (10 to 50) kHz (50 to 100) kHz	0.06 % + 2.8 mV 0.11 % + 9.6 mV 0.37 % + 32 mV	
(32 to 105) V	10 Hz to 10 kHz (10 to 50) kHz (50 to 100) kHz	0.06 % + 8.4 mV 0.19 % + 32 mV 0.37 % + 110 mV	

Parameter/ Range	Frequency	CMC ^{2,4,5} (\pm)	Comments
AC Voltage – Generate (cont)			
(105 to 320) V	40 Hz to 1 kHz (1 to 10) kHz (10 to 30) kHz	0.08 % + 20 mV 0.11 % + 32 mV 0.16 % + 64 mV	Wavetek 9100
(320 to 800) V	40 Hz to 1 kHz (1 to 10) kHz (10 to 30) kHz	0.08 % + 63 mV 0.11 % + 110 mV 0.16 % + 210 mV	
(800 to 1050) V	40 Hz to 1 kHz (1 to 10) kHz (10 to 20) kHz	0.08 % + 130 mV 0.11 % + 210 mV 0.16 % + 320 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 μ V 0.02 % + 2 μ V 0.03 % + 2 μ V 0.12 % + 2 μ V 0.58 % + 2 μ V 4.6 % + 2 μ V	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 μ V/V + 0.4 mV 80 μ V/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	
(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	
(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 Hz (50 to 100) kHz	6.0 % + 10 V	Fluke 80KV-40 probe and HP 3458A

Parameter/ Range	Frequency	CMC ^{2,4,5} (±)	Comments
AC Current – Generate (32 to 320) mA	10 Hz to 3 kHz (3 to 10) kHz (10 to 30) kHz	0.11 % + 32 µA 0.15 % + 48 µA 0.28 % + 96 µA	Wavetek 9100
AC Current – Generate (cont) (0.32 to 3.2) A (3.2 to 10.5) A (10.5 to 20) A 10 Turn Coil (10 to 100) A 50 Turn Coil (100 to 500) A	10 Hz to 3 kHz (3 to 10) kHz 10 Hz to 3 kHz (3 to 10) kHz 10 Hz to 3 kHz (3 to 10) kHz (95 to 440) Hz 95 Hz	0.14 % + 0.48 mA 0.28 % + 2.6 mA 0.24 % + 3 mA 0.53 % + 10 mA 0.25 % + 6.9 mA 0.59 % + 23 mA 0.6 % 0.6 %	Wavetek 9100
AC Current – Measure Up to 100 µA 100 µA to 100 mA 100 mA to 1 A	(10 to 20) Hz (20 to 45) Hz 45 Hz to 1 kHz (10 to 20) Hz (20 to 45) Hz (45 to 100) Hz 100 Hz to 5 kHz (10 to 20) Hz (20 to 45) Hz (45 to 100) Hz 100 Hz to 5 kHz	0.46 % + 0.03 µA 0.18 % + 0.03 µA 0.078 % + 0.03 µA 0.46 % + 20 µA 0.17 % + 20 µA 0.073 % + 20 µA 0.042 % + 20 µA 0.46 % + 200 µA 0.19 % + 200 µA 0.10 % + 200 µA 0.12 % + 200 µA	HP 3458A



III. Mechanical

Parameter/Equipment	Range	CMC ^{2,5} (±)	Comments
Vacuum	(1 to 30) in·Hg	0.02 %	GE Sensing 3025-3-P
	(3 to 500) psig	0.02 %	
Pressure –			
Hydraulic	(400 to 10 000) psig	0.02 %	Pressurements W2200/3HP
Pneumatic	(4 to 200) ins H ₂ O @ 60 °F	0.031 %	Ametek PK II
Torque – Measure	(5 to 20) in·lbf	0.2 in·lbf	GSE 220 (clockwise only)
	(20 to 100) in·lbf	0.6 in·lbf	
	(10 to 100) in·lbf (100 to 1000) in·lbf	1.2 % 1.2 %	Mountz LTT-100F Mountz BMX 1000F

IV. Thermodynamic

Parameter/Equipment	Range	CMC ² (±)	Comments
Temperature – Measure and Measuring Equipment	(-200 to 420) °C	0.05 °C	Hart 2560 PRT system with 5614 probe
Temperature – Measure ³	(-70 to 80) °C	0.24 °C	Vaisala M170 with HMP77B
Dewpoint – Measuring Equipment	(-80 to -50) °C (-50 to -20) °C (-20 to 0) °C (0 to 18) °C	0.41 °C 0.23 °C 0.20 °C 0.18 °C	Michell DG-2 dew point generator
Relative Humidity – Measuring Equipment	(10 to 95) % RH	0.50 % RH	Thunder Scientific 1200 Humidity Generator



Parameter/Equipment	Range	CMC ² (±)	Comments
Relative Humidity – Measure ³	(5 to 90) % RH	1.3 % RH	Vaisala M170 with HMP77B

V. Time & Frequency

Parameter/Equipment	Range	CMC ² (±)	Comments
Frequency – Measuring Equipment	5 Hz to 10 MHz	0.29 µHz/Hz	Wavetek 9100
Frequency – Measure	5 Hz to 225 MHz	0.29 µHz/Hz	HP 5334B

¹ This laboratory offers commercial 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 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. 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 reading, unless otherwise noted.

⁶ In the statement of CMC, L is the numerical value of the nominal length of the device measured in inches.





Accredited Laboratory

A2LA has accredited

CONTROL AUTOMATION TECHNOLOGIES CORP

Providence Forge, VA

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/NCCL 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 23rd day of May 2018.

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

President and CEO
For the Accreditation Council
Certificate Number 1486.02
Valid to April 30, 2020

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