



SCOPE OF ACCREDITATION TO ISO/IEC 17025:2017
& ANSI/NCSL Z540-1-1994

CONTROL AUTOMATION TECHNOLOGIES CORP
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CALIBRATION

Valid To: April 30, 2024

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 calibrations^{1, 7}:

I. Dimensional

| Parameter/Equipment | Range | CMC ^{2,5} (±) | Comments |
|---|-----------------|------------------------|---------------------|
| Micrometers ³ | Up to 12 in | (190 + 40L) µin | Grade 0 gage blocks |
| Calipers ³ – Outer Diameter, Inner Diameter, Depth | Up to 12 in | (200 + 50L) µin | Grade 0 gage blocks |
| Dial Indicators ³ | (0.001 to 1) in | 330 µin | Grade 0 gage blocks |

II. Electrical – DC/Low Frequency

| Parameter/Equipment | Range | CMC ^{2,4} (±) | Comments |
|------------------------------------|---|---|------------------------------|
| DC Voltage – Generate ³ | 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/ Fluke 5522A |

| Parameter/Equipment | Range | CMC ^{2, 4} (±) | Comments |
|-------------------------------------|---|--|--|
| DC Voltage – Measure ³ | (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 & HP 3458A |
| DC Current – Generate ³ | 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 (3.2 to 32) A (32 to 105) A (105 to 200) A (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 0.063 % + 0.94 μA 0.063 % + 4.5 mA 0.07 % + 1.2 mA 0.063 % + 9.4 mA 0.063 % + 45 mA 0.07 % + 5.9 mA 0.058 % + 47 mA 0.058 % + 0.23 A | Wavetek 9100/ Fluke 5522A |
| DC Current – Measure ³ | (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 ³ | | | |
| 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 | 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 | Wavetek 9100/ Fluke 5522A |
| High | (40 to 400) μF (0.4 to 4) mF (4 to 40) mF | 0.87 % + 160 nF 0.87 % + 1.6 μF 1.3 % + 60 μF | |

| Parameter/Equipment | Range | CMC ^{2,4} (±) | Comments |
|--|---|---|--|
| DC Resistance – Generate ³ | 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 0.30 % + 40 kΩ | Wavetek 9100, 4-wire/ Fluke 5522A, 4-wire |
| Resistance – Measure ³ | 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, 4-wire |
| Electrical Calibration of RTD Indicators ³ – | | | |
| Pt 385, Pt 392 (60 Ω to 2 kΩ) | (-200 to -100) °C (-100 to 100) °C (100 to 630) °C (630 to 850) °C | 0.19 °C 0.14 °C 0.24 °C 0.35 °C | Wavetek 9100/ Fluke 5522A |
| Pt 385, Pt 392 (100 Ω) | (-200 to 800) °C | 0.52 °C | Fluke 741B |
| Electrical Calibration of Thermocouple Indicators – | | | |
| Type E: | (-250 to -200) °C (-200 to -100) °C (-100 to 100) °C (100 to 1000) °C | 0.48 °C 0.25 °C 0.19 °C 0.25 °C | Wavetek 9100/ Fluke 5522A |
| Field Calibration ³ | (-250 to 1000) °C | 0.75 °C | Fluke 741B |
| Type J: | (-210 to -100) °C (-100 to 800) °C (800 to 1000) °C (1000 to 1200) °C | 0.30 °C 0.23 °C 0.26 °C 0.27 °C | Wavetek 9100/ Fluke 5522A |
| Field Calibration ³ | (-210 to 1200) °C | 0.46 °C | Fluke 741B |

| Parameter/Equipment | Range | CMC ^{2,4} (±) | Comments |
|---|---|---|------------------------------|
| Electrical Calibration of Thermocouple Indicators ³ – (cont) | | | |
| Type K | (-250 to -200) °C (-200 to -100) °C (-100 to 100) °C (100 to 600) °C (600 to 1372) °C | 0.59 °C 0.30 °C 0.22 °C 0.25 °C 0.31 °C | Wavetek 9100/ Fluke 5522A |
| Field Calibration ³ | (-200 to 1372) °C | 0.56 °C | Fluke 741B |
| Type T | (-250 to -200) °C (-200 to -100) °C (-100 to 0) °C (0 to 400) °C | 0.62 °C 0.29 °C 0.25 °C 0.19 °C | |
| Field Calibration ³ | (-250 to 400) °C | 1.1 °C | Fluke 741B |

| Parameter/Range | Frequency | CMC ^{2,4} (±) | Comments |
|------------------------------------|--|--|-------------------------------|
| AC Voltage – Generate ³ | | | |
| 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 / Fluke 5522A |
| (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 0.17 % + 9.6 mV 0.40 % + 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 0.40 % + 110 mV | |

| Parameter/Range | Frequency | CMC ^{2,4} (±) | Comments |
|--|--|--|---|
| AC Voltage – Generate ³ (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 / Fluke 5522A |
| (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 ³ | | | |
| 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 | |
| (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 | 6.0 % + 10 V | Fluke 80KV-40 probe & HP 3458A |

| Parameter/Range | Frequency | CMC ^{2,4} (±) | Comments |
|------------------------------------|---|--|-------------------------------|
| AC Current – Generate ³ | | | |
| (32 to 320) mA | 10 Hz to 3 kHz (3 to 10) kHz (10 to 30) kHz | 0.11 % + 32 μA 0.13 % + 48 μA 0.28 % + 96 μA | Wavetek 9100 / Fluke 5522A |
| (0.32 to 3.2) A | 10 Hz to 3 kHz (3 to 10) kHz | 0.14 % + 0.48 mA 0.28 % + 2.6 mA | |
| (3.2 to 10.5) A | 10 Hz to 3 kHz (3 to 10) kHz | 0.24 % + 3 mA 0.57 % + 10 mA | |
| (10.5 to 20) A | 10 Hz to 3 kHz (3 to 10) kHz | 0.25 % + 6.9 mA 0.59 % + 23 mA | |
| AC Current – Measure ³ | | | |
| 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 | |

| Parameter/ Range | Frequency | CMC ^{2,4} (±) | Comments |
|---------------------------------------|---|-------------------------|------------------|
| Oscilloscopes ³ – | | | |
| DC | | | Wavetek 9100/600 |
| 50 Ω | ± 4.4 mv to ± 2.78 V | 0.26 % + 40 μv | Fluke 5522A |
| 1 MΩ | ± 4.4 mv to ± 133 V | 0.26 % + 40 μv | |
| Square Wave | | | |
| 50 Ω | 4.4mv to 3.3 V 1 kHz | 0.29 % | |
| 1 M Ω | 4.4 mv to 133 V 1 kHz | 0.29 % | |
| Level Sine Wave | | | |
| Amplitude (50 Ω) (50kHz Reference) | 10 Hz to 50 kHz 50 kHz to 250 MHz (250 to 600) MHz | 2.0 % 2.0 % 6.0 % | |
| Flatness (50 kHz Reference) | 70 kHz to 100 MHz (100 to 250) MHz (250 to 600) MHz | 1.5 % 3.0 % 5.0 % | |
| Time Markers | 2 ns to 5.5 s | 4 μs/s | |

III. Fluid Quantities

| Parameter/Equipment | Range | CMC ^{2,5} (±) | Comments |
|---------------------|-------------------|------------------------|--------------------------|
| Gas Flow – Air & N2 | | | |
| Laminar Flow | (0.01 to 50) slpm | 0.20 % | Fluke Molbox standard |
| Sonic Flow | (10 to 120) slpm | 0.20 % | |

IV. Mechanical

| Parameter/Equipment | Range | CMC ^{2,5,6} (±) | Comments |
|---|---|--|--|
| Vacuum ³ – Measure & Measuring Equipment | (1 to 30) in·Hg (3 to 500) psig | 0.000 52 in·Hg + 0.000 16 in·Hg/in·Hg 0.0087 psi + 0.000 16 psi/psi | Fluke P3025-3-P |
| Pressure ³ – Measure & Measuring Equipment | | | |
| Hydraulic | (400 to 10 000) psig | 0.17 psi + 0.000 17 psi/psi | Pressurements W2200/3HP |
| Pneumatic | (4 to 200) ins H ₂ O @ 60 °F | 0.008 in·H ₂ O + 0.000 27 in·H ₂ O/in·H ₂ O | Ametek PK II |
| Torque – Measure ³ | (2.5 to 25) lb·in (25 to 75) lb·in (10 to 100) lb·ft (100 to 1000) lb·ft | 0.20 lbf·in 0.60 lbf·in 1.2 % 1.2 % | Mountz BMX25i Jetco TED-75is-P Mountz LTT-100F Mountz BMX 1000F |

V. Thermodynamic

| Parameter/Equipment | Range | CMC ^{2,6} (±) | Comments |
|--|------------------|-------------------------------|-----------------------------|
| Temperature – Measure & Measuring Equipment ³ | | | 2560 thermometer |
| | (-197 to 420) °C | 0.027 °C + 0.000 017 °C/°C | 5614 PRT |
| | (420 to 961) °C | 0.014 °C + 0.000 097 °C/°C | 5624 PRT |
| Temperature – Measure ³ | (10 to 38) °C | 0.23 °C | Vaisala M170 with HMP77B |

| Parameter/Equipment | Range | CMC ^{2,6} (±) | Comments |
|--|-------------------------------------|------------------------|--|
| Dewpoint – Measuring Equipment | (-60 to -40) °C (> -40 to 20) °C | 0.46 °C 0.3 °C | DewMaster chilled mirror hygrometer |
| Relative Humidity – Measuring Equipment | (10 to 95) % RH | 0.67 % RH | Thunder Scientific 1200 humidity generator |
| Relative Humidity – Measure ³ | (5 to 90) % RH | 1.3 % RH | Vaisala M170 with HMP77B |

VI. Time & Frequency

| Parameter/Equipment | Range | CMC ^{2,6} (±) | Comments |
|--|-----------------|------------------------|---------------------------|
| Frequency – Measuring Equipment ³ | 5 Hz to 10 MHz | 0.29 µHz/Hz | Wavetek 9100, Fluke 5522A |
| Frequency – Measure ³ | 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. 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; L is the numerical value of the nominal length of the device measured in inches, unless otherwise noted.
- ⁶ The type of instrument or material being calibrated is defined by the parameter. This indicates the laboratory is capable of calibrating instruments that measure or generate the values in the ranges indicated for the listed measurement parameter.
- ⁷ This scope meets A2LA's *P112 Flexible Scope Policy*.



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 17025:2017 *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 15th day of August 2022.

A blue ink signature of a representative of the Accreditation Council.

Vice President, Accreditation Services
For the Accreditation Council
Certificate Number 1486.02
Valid to April 30, 2024

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