SCOPE OF ACCREDITATION TO ISO/IEC 17025:2005
& ANSI/NCSL Z-540-1-1994 & ANSI/NCSL Z-540.3-2006

ALPHA CONTROLS AND INSTRUMENTATION
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CALIBRATION

Valid To: January 31, 2015 Certificate Number: 2260.01

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, 4] (±)	Comments
DC Voltage – Measure	Up to 200 mV (0.2 to 2) V (2 to 20) V (20 to 200) V (200 to 1000) V	5.3 µV/V + 0.9 µV 3.1 µV/V + 0.6 µV 3.7 µV/V + 0.2 µV 4.8 µV/V + 0.7 µV 5.6 µV/V + 0.5 mV	Reference DMM
DC Voltage – Generate	(0 to 330) mV 330 mV to 3.3 V (3.3 to 33) V (33 to 330) V (330 to 1000) V	19 µV/V + 2.1 µV 14 µV/V + 2.6 µV 12 µV/V + 20 µV 18 µV/V + 150 µV 18 µV/V + 1.5 mV	Multifunction calibrator
DC Current – Measure	Up to 200 µA 200 µA to 2 mA (2 to 20) mA (20 to 200) mA 200 mA to 2 A (2 to 20) A	13 µA/A + 2.1 µA 13 µA/A + 2.1 µA 15 µA/A + 2.1 µA 49 µA/A + 4.1 µA 0.018 % + 8 µA 0.04 % + 20 µA	Reference DMM

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Parameter/Equipment	Range	CMC[2, 4] (±)	Comments
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	0.016 % + 0.02 µA 0.01 % + 0.05 µA 0.01 % + 0.28 µA 0.01 % + 2.8 µA 0.02 % + 41 µA 0.039 % + 36 µA 0.066 % + 510 µA 0.1 % + 720 µA	Multifunction calibrator
Clamp-On Only	(0 to 1000) A	0.27 % + 0.062 A	DC Standard/coil
Resistance – Measure[5]	Up to 2 Ω (2 to 20) Ω (20 to 200) Ω 200 Ω to 2 kΩ (2 to 20) kΩ (20 to 200) kΩ 200 kΩ to 2 MΩ (2 to 20) MΩ (20 to 200) MΩ 200 MΩ to 2 GΩ	20 µΩ/Ω + 1.9 µΩ 11 µΩ/Ω + 0.67 µΩ 8.3 µΩ/Ω + 0.25µΩ 8.3 µΩ/Ω + 0.25 µΩ 8.3 µΩ/Ω + 0.25 mΩ 8.6 µΩ/Ω + 0.24 mΩ 11 µΩ/Ω + 0.46 Ω 23 µΩ/Ω + 4.9 Ω 0.015 % + 50 kΩ 1.6 mΩ/Ω + 0.50 MΩ	Reference DMM
Resistance – Generate[5]	(0 to 11) Ω (11 to 33) Ω (33 to 110) Ω (110 to 330) Ω 330 Ω to 1.1 kΩ (1.1 to 3.3) kΩ (3.3 to 11) kΩ (11 to 33) kΩ (33 to 110) kΩ (110 to 330) kΩ 330 kΩ to 1.1 MΩ (1.1 to 3.3) MΩ (3.3 to 11) MΩ (11 to 33) MΩ (33 to 110) MΩ (110 to 330) MΩ 330 MΩ to 1.1 GΩ	40 µΩ/Ω + 0.001 Ω 33 µΩ/Ω + 0.0015 Ω 34 µΩ/Ω + 0.0013 Ω 31 µΩ/Ω + 0.002 Ω 28 µΩ/Ω + 0.003 Ω 30 µΩ/Ω + 0.02 Ω 29 µΩ/Ω + 0.02 Ω 29 µΩ/Ω + 0.02 Ω 30 µΩ/Ω + 0.2 Ω 32 µΩ/Ω + 2.3 Ω 33 µΩ/Ω + 2.3 Ω 61 µΩ/Ω + 29 Ω 0.013 % + 260 Ω 0.026 % + 2.4 kΩ 0.052 % + 2.6 kΩ 0.3 % + 88 kΩ 1.5 % + 500 kΩ	Multifunction calibrator
Fixed Points	25 Ω 100 Ω 200 Ω 400 Ω	6 µΩ/Ω 6 µΩ/Ω 6 µΩ/Ω 6 µΩ/Ω	Hart Scientific 3591

Parameter/Range	Frequency	CMC[2, 4] (±)	Comments
AC Voltage – Measure			
Up to 200 mV	(1 to 10) Hz	0.017 % + 69 µV	Reference DMM
	(10 to 40) Hz	0.014 % + 20 µV	
	(40 to 100) Hz	0.012 % + 20 µV	
	100 Hz to 2 kHz	0.011 % + 11 µV	
	(2 to 10) kHz	0.014 % + 20 µV	
	(10 to 30) kHz	0.034 % + 40 µV	
	(30 to 100) kHz	0.077 % + 110 µV	
200 mV to 2 V	(1 to 10) Hz	0.015 % + 120 µV	
	(10 to 40) Hz	0.012 % + 20 µV	
	(40 to 100) Hz	90 µV/V + 20 µV	
	100 Hz to 2 kHz	75 µV/V + 20 µV	
	(2 to 10) kHz	0.011 % + 20 µV	
	(10 to 30) kHz	0.022 % + 40 µV	
	(30 to 100) kHz	0.057 % + 200 µV	
	(100 to 300) kHz	0.3 % + 2 mV	
	300 kHz to 1 MHz	1 % + 20 mV	
(2 to 20) V	(1 to 10) Hz	0.015 % + 1.2 mV	
	(10 to 40) Hz	0.011 % + 200 µV	
	(40 to 100) Hz	90 µV/V + 200 µV	
	100 Hz to 2 kHz	75 µV/V + 200 µV	
	(2 to 10) kHz	0.011 % + 200 µV	
	(10 to 30) kHz	0.022 % + 400 µV	
	(30 to 100) kHz	0.057 % + 2 mV	
	(100 to 300) kHz	0.3 % + 20 mV	
	300 kHz to 1 MHz	1 % + 200 mV	
(20 to 200) V	(1 to 10) Hz	0.015 % + 12 mV	
	(10 to 40) Hz	0.012 % + 2 mV	
	(40 to 100) Hz	90 µV/V + 2 mV	
	100 Hz to 2 kHz	75 µV/V + 2 mV	
	(2 to 10) kHz	0.011 % + 2 mV	
	(10 to 30) kHz	0.022 % + 4 mV	
	(30 to 100) kHz	0.057 % + 20 mV	
	(100 to 300) kHz	0.3 % + 20 mV	
	300 kHz to 1 MHz	1 % + 200 mV	

Parameter/Range	Frequency	CMC[2, 4] (±)	Comments
AC Voltage – Measure (cont)			
(200 to 300) V	(1 to 10) Hz (10 to 40) Hz 40 Hz to 10 kHz (10 to 30) kHz (30 to 100) kHz	0.015 % + 21 mV 0.012 % + 6 mV 0.012 % + 6 mV 0.023 % + 12 mV 0.058 % + 60 mV	Reference DMM
(300 to 1050) V	(1 to 10) Hz (10 to 40) Hz 40 Hz to 10 kHz (10 to 30) kHz (30 to 100) kHz	0.017 % + 63 mV 0.015 % + 11 mV 0.011 % + 20 mV 0.028 % + 34 mV 0.062 % + 190 mV	
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	0.08 % + 6 µV 0.019 % + 6 µV 0.023 % + 7 µV 0.1 % + 6 µV 0.35 % + 12 µV 0.8 % + 50 µV	Multifunction calibrator
(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 (100 to 500) kHz	0.03 % + 9 µV 0.015 % + 9 µV 0.016 % + 10 µV 0.036 % + 10 µV 0.08 % + 33 µV 0.25 % + 58 µV	
(0.33 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	0.03 % + 51 µV 0.015 % + 61 µV 0.019 % + 62 µV 0.031 % + 50 µV 0.08 % + 89 µV 0.3 % + 490 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	0.03 % + 620 µV 0.015 % + 600 µV 0.024 % + 600 µV 0.035 % + 640 µV 0.09 % + 1.9 mV	

Parameter/Range	Frequency	CMC[2, 4] (±)	Comments
AC Voltage – Generate (cont)			
(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	0.019 % + 1.8 µV 0.021 % + 5.6 µV 0.025 % + 5.8 µV 0.032 % + 5.6 µV 0.22 % + 42 µV	Multifunction calibrator
(330 to 1020) V	45 Hz to 1 kHz (1 to 5) kHz (5 to 10) kHz	0.03 % + 10 mV 0.025 % + 10 mV 0.03 % + 10 mV	
AC Current – Measure			
Up to 200 µA	(1 to 10) Hz 10 Hz to 10 kHz (10 to 30) kHz (30 to 100) kHz	0.031 % + 20 nA 0.03 % + 20 nA 0.071 % + 20 nA 0.4 % + 20 nA	Reference DMM
200 µA to 2 mA	(1 to 10) Hz 10 Hz to 10 kHz (10 to 30) kHz (30 to 100) kHz	0.031 % + 200 nA 0.03 % + 200 nA 0.071 % + 200 nA 0.4 % + 200 nA	
(2 to 20) mA	(1 to 10) Hz 10 Hz to 10 kHz (10 to 30) kHz (30 to 100) kHz	0.031 % + 2 µA 0.03 % + 2 µA 0.071 % + 2 µA 0.4 % + 2 µA	
(20 to 200) mA	(1 to 10) Hz 10 Hz to 10 kHz (10 to 30) kHz	0.031 % + 100 µA 0.029 % + 100 µA 0.063 % + 100 µA	
200 mA to 2 A	10 Hz to 2 kHz (2 to 10) kHz (10 to 30) kHz	0.062 % + 100 µA 0.073 % + 100 µA 0.3 % + 100 µA	
(2 to 20) A	10 Hz to 2 kHz (2 to 10) kHz	0.082 % + 100 µA 0.25 % + 100 µA	

Parameter/Range	Frequency	CMC[2, 4] (±)	Comments
AC Current – Generate			
(29 to 330) 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	0.2 % + 0.1 µA 0.15 % + 0.1 µA 0.13 % + 0.1 µA 0.3 % + 0.15 µA 0.8 % + 0.2 µA 1.6 % + 0.4 µA	Multifunction calibrator
(0.33 to 3.3) 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	0.2 % + 0.15 µA 0.13 % + 0.15 µA 0.1 % + 0.15 µA 0.2 % + 0.2 µA 0.5 % + 0.3 µA 1 % + 0.6 µA	
(3.3 to 33) 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	0.18 % + 2 µA 0.09 % + 2 µA 0.04 % + 2 µA 0.08 % + 2 µA 0.2 % + 3 µA 0.4 % + 4 µA	
(33 to 330) 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	0.18 % + 20 µA 0.09 % + 20 µA 0.04 % + 20 µA 0.1 % + 50 µA 0.2 % + 100 µA 0.4 % + 200 µA	
(0.33 to 3) A	(10 to 45) Hz 45 Hz to 1 kHz (1 to 5) kHz (5 to 10) kHz	0.18 % + 100 µA 0.06 % + 100 µA 0.6 % + 1000 µA 2.5 % + 5000 µA	
(3 to 11) A	(45 to 100) Hz 100 Hz to 1 kHz (1 to 5) kHz	0.06 % + 2 mA 0.1 % + 2 mA 3 % + 2 mA	
(11 to 20.5) A	(45 to 100) Hz 100 Hz to 1 kHz (1 to 5) kHz	0.12 % + 5 mA 0.15 % + 5 mA 3 % + 5 mA	
Clamp-On Only (0 to 1000) A	(45 to 65) Hz (65 to 440) Hz	0.3 % + 0.14 A 1.3 % + 0.27 A	AC standard/coil

Parameter/Range	Frequency	CMC[2, 4] (±)	Comments
Capacitance – Generate			
(0.19 to 0.4) nF	10 Hz to 10 kHz	0.06 % + 0.01 nF	Multifunction calibrator
(0.4 to 1.1) nF	10 Hz to 10 kHz	0.05 % + 0.01 nF	
(1.1 to 3.3) nF	10 Hz to 3 kHz	0.05 % + 0.01 nF	
(3.3 to 11) nF	10 Hz to 1 kHz	0.25 % + 0.01 nF	
(11 to 33) nF	10 Hz to 1 kHz	0.25 % + 0.1 nF	
(33 to 110) nF	10 Hz to 1 kHz	0.27 % + 0.1 nF	
(110 to 330) nF	10 Hz to 1 kHz	0.25 % + 0.3 nF	
(0.33 to 1.1) µF	(10 to 600) Hz	0.28 % + 1 nF	
(1.1 to 3.3) µF	(10 to 300) Hz	0.27 % + 3 nF	
(3.3 to 11) µF	(10 to 150) Hz	0.28 % + 9 nF	
(11 to 33) µF	(10 to 120) Hz	0.41 % + 29 nF	
(33 to 110) µF	(10 to 80) Hz	0.46 % + 99 nF	
(110 to 330) µF	Up to 50 Hz	0.52 % + 220 nF	
(0.33 to 1.1) mF	Up to 20 Hz	0.45 % + 1.1 µF	
(1.1 to 3.3) mF	Up to 6 Hz	0.45 % + 3 µF	
(3.3 to 11) mF	Up to 2 Hz	0.45 % + 9.9 µF	
(11 to 33) mF	Up to 0.6 Hz	0.75 % + 30 µF	
(33 to 110) mF	Up to 0.2 Hz	1.1 % + 100 µF	

Parameter/Equipment	Range	CMC[2] (±)	Comments
Electrical Calibration of Thermocouples and Thermocouple Indicating Devices – Measure and Generate			
Type E	(-250 to -100) ºC	0.58 °C	Multifunction calibrator
	(-100 to -25) ºC	0.20 °C	
	(-25 to 350) ºC	0.17 °C	
	(350 to 650) ºC	0.20 °C	
	(650 to 1000) ºC	0.25 °C	
Type J	(-210 to -100) ºC	0.32 °C	
	(-100 to -30) ºC	0.20 °C	
	(-30 to 150) ºC	0.18 °C	
	(150 to 760) °C	0.21 °C	
	(760 to 1200) °C	0.28 °C	
Type K	(-200 to -100) ºC	0.39 °C	
	(-100 to -25) ºC	0.23 °C	
	(-25 to 120) ºC	0.20 °C	
	(120 to 1000) ºC	0.31 °C	
	(1000 to 1372) ºC	0.47 °C	

Parameter/Equipment	Range	CMC[2] (±)	Comments
Electrical Calibration of Thermocouples and Thermocouple Indicating Devices – Measure and Generate (cont)			
Type N	(-200 to -100) ºC (-100 to -25) ºC (-25 to 120) ºC (120 to 410) ºC (410 to 1300) ºC	0.48 °C 0.28 °C 0.25 °C 0.24 °C 0.34 °C	Multifunction calibrator
Type R	(0 to 250) ºC (250 to 400) ºC (400 to 1000) ºC (1000 to 1767) ºC	0.86 °C 0.67 °C 0.65 °C 0.70 °C	
Type S	(0 to 250) ºC (250 to 1000) ºC (1000 to 1400) ºC (1400 to 1767) ºC	0.78 °C 0.68 °C 0.68 °C 0.75 °C	
Type T	(-250 to -150) ºC (-150 to 0) ºC (0 to 120) ºC (120 to 400) ºC	0.73 °C 0.29 °C 0.20 °C 0.18 °C	
Electrical Calibration of RTD Indicating Devices – Generate[5]			
Pt 385, 100 Ω	(-200 to -80) ºC (-80 to 0) ºC (0 to 100) ºC (100 to 300) ºC (300 to 400) ºC (400 to 630) ºC (630 to 800) ºC	0.06 ºC 0.06 ºC 0.08 ºC 0.10 ºC 0.12 ºC 0.14 ºC 0.27 ºC	Multifunction calibrator
Pt 3926, 100 Ω	(-200 to -80) ºC (-80 to 0) ºC (0 to 100) ºC (100 to 300) ºC (300 to 400) ºC (400 to 630) ºC	0.06 ºC 0.06 ºC 0.08 ºC 0.10 ºC 0.12 ºC 0.14 ºC	

Parameter/Equipment	Range	CMC[2] (±)	Comments
Electrical Calibration of RTD Indicating Devices – Generate[5] (cont)			
Pt 3916, 100 Ω	(-200 to -190) ºC (-190 to -80) ºC (-80 to 0) ºC (0 to 100) ºC (100 to 260) ºC (260 to 300) ºC (300 to 400) ºC (400 to 600) ºC (600 to 630) ºC	0.29 ºC 0.05 ºC 0.06 ºC 0.07 ºC 0.08 ºC 0.09 ºC 0.10 ºC 0.12 ºC 0.27 ºC	Multifunction calibrator
Pt 385, 200 Ω	(-200 to -80) ºC (-80 to 0) ºC (0 to 100) ºC (100 to 260) ºC (260 to 300) ºC (300 to 400) ºC (400 to 600) ºC (600 to 630) ºC	0.05 ºC 0.05 ºC 0.05 ºC 0.06 ºC 0.14 ºC 0.15 ºC 0.16 ºC 0.19 ºC	

II. Mechanical

Parameter/Equipment	Range	CMC[2, 4] (±)	Comments
Pressure –			
Differential	(-1 to 1) inH_2O (-30 to 30) inH_2O (-60 to 60) inH_2O	0.00015 inH_2O 0.01 % 0.009 %	Ruska 7250LP pressure calibrator
Pneumatic	(0 to 5) psig (5 to 15) psig (15 to 30) psig (30 to 300) psig (0 to 9) psia (9 to 30) psia (30 to 300) psia	0.0005 psig 0.010 % + 0.00004 psig 0.0027 psig 0.009 %+ 0.00026 psig 0.0011 psia 0.008%+ 0.0011 psia 0.009%+ 0.0011 psia	Pressure calibrator see footnote 6

Parameter/Equipment	Range	CMC[2, 4] (±)	Comments
Pressure – (cont)			
Hydraulic	(100 to 10 000) psi	0.04 %	Deadweight tester
Barometric	(750 to 1150) mbar	0.11 mbar	Reference pressure monitor
Vacuum	(0 to -14.5) psig	0.0015 psig	Pressure calibrator see footnote 6

III. Thermodynamic

Parameter/Equipment	Range	CMC[2, 4] (±)	Comments
Temperature – Measure	(-200 to 480) ºC (480 to 660) ºC (660 to 1200) ºC	0.008 ºC 0.016 ºC 2.3 ºC	SPRT and Superthermometer TC-S
Temperature – Measuring Equipment	(-80 to -30) ºC (-30 to 100) ºC (100 to 300) ºC (300 to 660) ºC (660 to 1200) ºC	0.014 ºC 0.012 ºC 0.015 ºC 0.36 ºC 3.7 ºC	Temperature baths, temperature chamber, dry well calibrator
	-196 ºC -38.83 ºC 0.01 ºC 231.928 ºC 419.527 ºC 660.323 ºC	7 mK (0.007 ºC) 6 mK (0.006 ºC) 3 mK (0.003 ºC) 4 mK (0.004 ºC) 6 mK (0.006 ºC) 9 mK (0.009 ºC)	Liquid nitrogen & fixed points
	(-15 to 35) ºC (35 to 200) ºC (200 to 500) ºC	0.5 ºC 0.23 % + 0.35 ºC 0.30 % + 0.20 ºC	Infrared calibrator

Parameter/Equipment	Range	CMC[2] (±)	Comments
Relative Humidity – Measuring Equipment Dew Point Temperature	(10 to 95) % RH (-30 to +30) ºC	0.6 % RH 0.1 ºC	Humidity generator

IV. Time & Frequency

Parameter/Equipment	Range	CMC[2, 4] (±)	Comments
Frequency – Measure	DC to 225 MHz	0.001 % + 0.008 Hz	Frequency counter

Field Calibration Services:

V. Electrical – DC/Low Frequency

Parameter/Equipment	Range	CMC[2, 4] (±)	Comments
DC Voltage – Measure[3]	(0 to 110) mV 110 mV to 1.1 V (1.1 to 11) V (11 to 110) V (110 to 300) V	0.029 % + 0.019 % fs 0.026 % + 0.007 % fs 0.026 % + 0.005 % fs 0.058 % + 0.006 % fs 0.056 % + 0.025 % fs	Process calibrator
DC Voltage – Generate[3]	(0 to 110) mV 110 mV to 1.1 V (1.1 to 15) V	0.011 % + 0.005 % fs 0.010 % + 0.005 % fs 0.011 % + 0.005 % fs	Process calibrator
DC Current – Measure[3]	(0 to 30) mA (30 to 110) mA	0.012 % + 0.15 % fs 0.012 % + 0.15 % fs	Process calibrator
DC Current – Generate[3] Tx Simulator	 (0 to 22) mA	 0.013 % + 0.015 % fs	 Process calibrator

Parameter/Equipment	Range	CMC[2, 4] (±)	Comments
Resistance – Measure[5]	(0 to 11) Ω (11 to 110) Ω 110 Ω to 1.1 kΩ (1.1 to 11) kΩ	0.056 % + 0.06 Ω 0.059 % + 0.06 Ω 0.057 % + 0.6 Ω 0.12 % + 11.7 Ω	Process calibrator
Resistance – Generate[5]	(0 to 11) Ω (11 to 110) Ω 110 Ω to 1.1 kΩ (1.1 to 11) kΩ	0.023 Ω 0.011 % + 0.048 Ω 0.023 % + 0.6 Ω 0.034 % + 6 Ω	Process calibrator

Parameter/Range	Frequency	CMC[2] (±)	Comments
AC Frequency – Measure[3]	(1 to 109.99) Hz (110 to 1099.9) Hz (1.1 to 10.999) kHz (11 to 50) kHz	0.06 Hz 0.64 Hz 0.006 kHz 0.06 kHz	Process calibrator
AC Frequency – Generate[3]	(1 to 10.99) Hz (11 to 109.9) Hz (110 to 1099.9) Hz (1.1 to 21.99) kHz (22 to 50) kHz	0.02 Hz 0.02 Hz 0.02 Hz 0.003 kHz 0.006 kHz	Process calibrator
AC Voltage – Measure[3] (0 to 300) V	 (40 to 500) Hz	 0.57 % + 6 counts	 Process calibrator

Parameter/Equipment	Range	CMC[2] (±)	Comments
Electrical Calibration of Thermocouples and Thermocouple Indicating Devices – Measure[3] Type J	 (-210 to -100) ºC (-100 to 800) ºC (800 to 1200) ºC	 0.72 °C 0.40 °C 0.61 °C	 Process calibrator

Parameter/Equipment	Range	CMC[2] (±)	Comments
Electrical Calibration of Thermocouples and Thermocouple Indicating Devices – Measure[3] (cont)			
Type K	(-210 to -100) ºC (-100 to 400) ºC (400 to 1200) ºC (1200 to 1372) °C	0.84 °C 0.40 °C 0.61 °C 0.84 °C	Process calibrator
Type T	(-250 to -200) ºC (-200 to 0) ºC (0 to 400) ºC	1.20 °C 0.72 °C 0.40 °C	
Electrical Calibration of Thermocouples and Thermocouple Indicating Devices – Generate[3]			
Type J	(-210 to -100) ºC (-100 to 800) ºC (800 to 1200) ºC	0.39 °C 0.29 °C 0.29 °C	Process calibrator
Type K	(-210 to -100) ºC (-100 to 400) ºC (400 to 1200) ºC (1200 to 1372) °C	0.50 °C 0.39 °C 0.39 °C 0.39 °C	
Type T	(-250 to -200) ºC (-200 to 0) ºC (0 to 400) ºC	1.1 °C 0.50 °C 0.39 °C	

Parameter/Equipment	Range	CMC[2] (±)	Comments
Electrical Calibration of RTD Indicating Devices – Generate[3, 5]			
Pt 385, 100 Ω	(-200 to 0) ºC (0 to 400) ºC (400 to 800) ºC	0.2 °C 0.28 °C 0.49 °C	Process calibrator
Pt 385, 1000 Ω	(-200 to 0) ºC (0 to 400) ºC (400 to 800) ºC	0.2 °C 0.28 °C 0.49 °C	
Pt 3926, 100 Ω	(-200 to 0) ºC (0 to 630) ºC	0.2 °C 0.28 °C	
Pt 3916, 100 Ω	(-200 to -190) ºC (-190 to 0) ºC (0 to 630) ºC	0.38 °C 0.2 °C 0.28 °C	
Electrical Calibration of RTD Indicating Devices – Measure[3, 5]			
Pt 385, 100 Ω	(-200 to 0) ºC (0 to 400) ºC (400 to 800) ºC	0.39 °C 0.61 °C 0.96 °C	Process calibrator
Pt 385, 1000 Ω	(-200 to 0) ºC (0 to 400) ºC (400 to 800) ºC	0.39 °C 0.61 °C 0.96 °C	
Pt 3926, 100 Ω	(-200 to 0) ºC (0 to 630) ºC	0.38 °C 0.6 °C	
Pt 3916, 100 Ω	(-200 to -190) ºC (-190 to 0) ºC (0 to 630) ºC	0.38 °C 0.38 °C 0.6 °C	

VI. Mechanical

Parameter/Equipment	Range	CMC[2, 4] (±)	Comments
Pressure[3] –			
Pneumatic	(-1 to +1) inH_2O (-15 to +15) inH_2O	0.22 % + 0.0012 inH_2O 0.22 % + 0.014 inH_2O	Setra 869
	(0 to 150) psia (0 to 150) psig (150 to 500) psig (0 to 10 000) psig	0.037 psia 0.037 psig 0.12 % 0.10 % + 2 psig	Pressure standard and indicator
Barometric	(750 to 1150) mbar	0.25 mbar	Pressure standard and indicator
Vacuum – Pneumatic[3]	(0 to -14.5) psig	0.037 psig	Pressure standard and indicator

VII. Thermodynamics

Parameter/Equipment	Range	CMC[2] (±)	Comments
Temperature – Measure[3]	(-200 to 660) ºC	0.047 ºC	Digital thermometers and PRT
Temperature – Measuring Equipment[3]	(-45 to 100) ºC (100 to 660) ºC	0.1 °C 0.36 °C	Dry well calibrator
Humidity – Measure[3]	(10 to 90) % RH	0.9 % RH	Rotronic HygroClip HC2
Humidity – Measuring Equipment[3]	(10 to 90) % RH	1.0 % RH	Rotronic HygroGen 2A

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

[2] Calibration and Measurement Capability (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. Calibration and Measurement Capabilities 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] In the statement of CMC, percentages are percentages of reading/output, unless otherwise noted.

[5] The method used for the CMC is a 4 wire method.

[6] Auto zero function performed referenced to a standard barometer.

American Association for Laboratory Accreditation

Accredited Laboratory

A2LA has accredited

ALPHA CONTROLS & INSTRUMENTATION INC.

Markham, Ontario, Canada

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/NCSLI Z540-1-1994 and the requirements of ANSI/NCSLI Z540.3-2006 and any additional program requirements in the field of calibration. 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 16th day of January 2013.

President & CEO
For the Accreditation Council
Certificate Number 2260.01
Valid to January 31, 2015

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