



SCOPE OF ACCREDITATION TO ISO/IEC 17025:2017

WESCAN CALIBRATION
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CALIBRATION

Valid To: January 31, 2023

Certificate Number: 1500.03

In recognition of the successful completion of the A2LA evaluation process, accreditation is granted to this laboratory to perform the following calibrations^{1, 8}:

I. Dimensional

Parameter/Equipment	Range	CMC ^{2, 4} (±)	Comments
Length Standards	(1 to 24) in	(17 + 2.2L) µin	Gauge blocks, gauging head & amplifier
Crimp Tools	(0.011 to 0.25) in Above 0.25 in	0.000 23 in 0.000 23 in	Pin gauges, precision micrometer, digital caliper
Diameter – External	Up to 1 in	40 µin	Digital micrometer
Height Gauges ^{3, 5}	Up to 24 in (24 to 40) in	(1.0 + 3.7L) µin (13 + 3.5L) µin	Gauge blocks
Calipers ^{3, 5}	Up to 40 in	(5.6 + 4.1L) µin	Gauge blocks

Parameter/Equipment	Range	CMC ^{2,4} (±)	Comments
Micrometers ^{3,5} – OD ID Depth	Up to 60 in Up to 24 in Up to 12 in	(8.2 + 3.8L) μin (5.5 + 4.0L) μin (2.9 + 3.4L) μin	Gauge blocks
Indicators ^{3,5}	Up to 3 in	(7.0 + 2.8L) μin	Gauge blocks
Indicator Calibrators ⁵	Up to 2 in	12 μin	Gauge blocks
Gauge Head/Amplifier (MU Checker)	(0.0001 to 0.2) in	5.4 μin	Gauge blocks
Step Gauges	Up to 6 in	(11 + 2.7L) μin	Gauge blocks
ID Instruments ^{3,5}	Up to 24 in	(5.5 + 4.0L) μin	Gauge blocks, gauging head/amplifier
Thickness Gauges ^{3,5}	(0.001 to 0.6) in (>0.6 to 1) in	4.7 μin 11 μin	Shims & gauge blocks
Precision Levels ⁵	Up to 12 in	27 μin/in	Sine bar, gauge blocks, surface plate
Rulers ⁵	Up to 42 in	6.0L μin	Gauge blocks
Protractors ⁵	At 0° and 90° (> 0° to < 90)°	0.0015° 0.0029°	Sine plate, gauge blocks, square

II. Electrical – DC/Low Frequency

Parameter/Equipment	Range	CMC ^{2, 10} (±)	Comments
DC Voltage – Measure & Generate ³	(0 to 100) mV 100 mV to 1 V (1 to 10) V (10 to 100) V (100 to 1 000) V	8.4 $\mu\text{V/V}$ + 1.4 μV 7.4 $\mu\text{V/V}$ + 3.4 μV 9.7 $\mu\text{V/V}$ + 2.2 μV 9.5 $\mu\text{V/V}$ + 0.29 mV 25 $\mu\text{V/V}$ + 0.50 mV	Fluke 5520A w/ HP 3458A
Measure Only	(1 to 6) kV	0.15 % - 1.2 V	Fluke 80E-10 w/ HP3458A
DC Current – Measure ³	(0 to 120) nA 100 nA to 1.2 μA (1 to 12) μA (10 to 120) μA 100 μA to 1.2 mA (1 to 12) mA (10 to 120) mA 100 mA to 1.05 A (1 to 3) A (3 to 10) A (10 to 20) A	290 $\mu\text{A/A}$ + 73 pA 25 $\mu\text{A/A}$ + 68 pA 23 $\mu\text{A/A}$ + 0.12 nA 23 $\mu\text{A/A}$ + 0.93 nA 23 $\mu\text{A/A}$ + 5.9 pA 23 $\mu\text{A/A}$ + 59 pA 40 $\mu\text{A/A}$ 0.013 % + 12 μA 0.016 % + 48 μA 0.017 % + 16 μA 0.025 % - 0.38 mA	HP 3458A Fluke Y5020 & HP 3458A

Parameter/Equipment	Range	CMC ^{2, 7, 10} (\pm)	Comments
DC Current – Generate ³	(0 to 100) nA	580 μ A/A + 100 pA	Fluke 5520A w/ HP 3458A
	100 nA to 1 μ A	40 μ A/A + 90 pA	
	(1 to 10) μ A	22 μ A/A + 0.14 nA	
	(10 to 100) μ A	23 μ A/A + 0.94 nA	
Generate Only – Torroidal Clamps	100 μ A to 1 mA	23 μ A/A + 6.5 pA	Fluke 5520A w/ Fluke Y5020 & HP 3458A
	(1 to 10) mA	23 μ A/A + 64 pA	
	(10 to 100) mA	40 μ A/A	
	100 mA to 1 A	0.013 % + 12 μ A	
Non-Torroidal Clamps	(1 to 3) A	0.016 % + 47 μ A	Fluke 5520A w/ Fluke 5500A/coil
	(3 to 10) A	0.017 % + 12 μ A	
Generate Only – Torroidal Clamps	(10 to 20) A	0.035 % - 1.4 mA	Fluke 5520A w/ Fluke 5500A/coil
	(20 to 150) A	0.23 % + 13 mA	
Non-Torroidal Clamps	(150 to 1025) A	0.25 % + 22 mA	Fluke 5520A w/ Fluke 5500A/coil
	(20 to 150) A	0.45 % + 0.13 A	
Resistance – Measure & Generate ³	(150 to 1025) A	0.46 % + 0.43 A	Fluke 5520A w/ HP 3458A
	(1 to 11) m Ω	0.052 %	
Resistance – Measure & Generate ³	11 m Ω to 10 Ω	13 $\mu\Omega/\Omega$ + 100 $\mu\Omega$	Leeds & Northrup 4300 w/HP 3458A
	(10 to 100) Ω	13 $\mu\Omega/\Omega$ + 0.72 m Ω	
	100 Ω to 1 k Ω	11 $\mu\Omega/\Omega$ + 1.6 m Ω	
	(1 to 10) k Ω	10 $\mu\Omega/\Omega$ + 19 m Ω	
	(10 to 100) k Ω	11 $\mu\Omega/\Omega$ + 120 m Ω	
	100 k Ω to 1 M Ω	15 $\mu\Omega/\Omega$ + 5.4 Ω	
	(1 to 10) M Ω	50 $\mu\Omega/\Omega$ + 200 Ω	
	(10 to 100) M Ω	0.058 % + 1.4 k Ω	
	100 M Ω to 1 G Ω	0.58 % + 11 k Ω	

Parameter/Range	Frequency	CMC ^{2, 10} (±)	Comments
Capacitance – Generate ³			Fluke 5520A
(0.19 to 0.4) nF	10 Hz to 10 kHz	0.51 % + 8.7 pF	
(0.4 to 1.1) nF	10 Hz to 10 kHz	0.34 % + 8.9 pF	
(1.1 to 3.3) nF	10 Hz to 3 kHz	0.38 % + 9.0 pF	
(3.3 to 11) nF	10 Hz to 1 kHz	0.20 % + 8.9 pF	
(11 to 33) nF	10 Hz to 1 kHz	0.20 % + 80 pF	
(33 to 110) nF	10 Hz to 1 kHz	0.20 % + 82 pF	
(110 to 330) nF	10 Hz to 1 kHz	0.20 % + 0.24 nF	
330 nF to 1.1 μF	(10 to 300) Hz	0.20 % + 0.82 nF	
(1.1 to 3.3) μF	(10 to 300) Hz	0.20 % + 2.5 nF	
(3.3 to 11) μF	(10 to 150) Hz	0.20 % + 82 pF	
(11 to 33) μF	(10 to 120) Hz	0.32 % + 24 nF	
(33 to 110) μF	(10 to 80) Hz	0.37 % + 78 nF	
(110 to 330) μF	(0 to 50) Hz	0.37 % + 0.24 nF	
330 μF to 1.1 mF	(0 to 20) Hz	0.35 % + 0.92 μF	
(1.1 to 3.3) mF	(0 to 6) Hz	0.36 % + 2.4 μF	
(3.3 to 11) mF	(0 to 2) Hz	0.36 % + 8.1 μF	
(11 to 33) mF	(0 to 0.6) Hz	0.22 % + 69 μF	
(33 to 110) mF	(0 to 0.2) Hz	0.88 % + 80 μF	

Parameter/Equipment	Range	CMC ^{2, 10} (±)	Comments
DC Power ³ – Generate			Fluke 5520A
33 mV to 1020 V (@)			
(0.33 to 330) mA	(0.000 011 to 336.6) W	0.022 % + 48 μW	
(0.33 to 3) A	(0.011 to 3060) W	0.020 % + 0.18 mW	
(3 to 20.5) A	(0.99 to 20 910) W	0.063 % - 0.24 mW	

Parameter/Range	Frequency	CMC ^{2, 10} (±)	Comments
AC Power ³ – Generate			
(33 to 330) mV @			
(3.3 to 9) mA	(45 to 65) Hz	0.27 % - 0.024 μW	Fluke 5520A
(9 to 33) mA	(45 to 65) Hz	0.11 % + 0.18 μW	
(33 to 90) mA	(45 to 65) Hz	0.13 % + 0.028 W	
(90 to 330) mA	(45 to 65) Hz	0.091 % + 0.032 μW	
(330 to 900) mA	(45 to 65) Hz	0.12 % - 0.42 μW	
(0.9 to 2.2) A	(45 to 65) Hz	0.10 % + 2.3 μW	
(2.2 to 4.5) A	(45 to 65) Hz	0.12 % - 1.2 μW	
(4.5 to 20.5) A	(45 to 65) Hz	0.10 % + 7.0 μW	
330 mV to 1020 V @			
(3.3 to 9) mA	(45 to 65) Hz	0.11 % + 0.29 μW	
(9 to 33) mA	(45 to 65) Hz	0.10 % - 0.27 mW	
(33 to 90) mA	(45 to 65) Hz	0.11 % - 0.035 μW	
(90 to 330) mA	(45 to 65) Hz	0.073 % - 0.65 mW	
(330 to 900) mA	(45 to 65) Hz	0.11 % - 0.59 mW	
(0.9 to 2.2) A	(45 to 65) Hz	0.084 % - 0.18 mW	
(2.2 to 4.5) A	(45 to 65) Hz	0.11 % + 21 mW	
(4.5 to 20.5) A	(45 to 65) Hz	0.091 % + 1.1 mW	

Parameter/Equipment	Range	CMC ² (±)	Comments
Electrical Calibration of RTD Indicators & Indicating Systems ³ –			
Pt 385, 3926, 100 Ω	(-200 to 0) °C (0 to 100) °C (100 to 300) °C (300 to 400) °C (400 to 630) °C	0.050 °C 0.060 °C 0.080 °C 0.090 °C 0.11 °C	Fluke 5520A
Pt 385 Only	(630 to 800) °C	0.21 °C	
Pt 3916, 100 Ω	(-200 to -190) °C (-190 to -80) °C (-80 to 100) °C (100 to 260) °C (260 to 300) °C (300 to 400) °C (400 to 600) °C (600 to 630) °C	0.23 °C 0.040 °C 0.050 °C 0.060 °C 0.070 °C 0.080 °C 0.090 °C 0.21 °C	
Pt 385, 200 Ω	(-200 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 0.050 °C 0.11 °C 0.12 °C 0.13 °C 0.14 °C	
Pt 385, 500 Ω	(-200 to -80) °C (-80 to 260) °C (260 to 400) °C (400 to 600) °C (600 to 630) °C	0.040 °C 0.050 °C 0.070 °C 0.080 °C 0.10 °C	
Pt 385, 1000 Ω	(-200 to 0) °C (0 to 100) °C (100 to 300) °C (300 to 600) °C (600 to 630) °C	0.030 °C 0.040 °C 0.050 °C 0.060 °C 0.21 °C	
PtNi 385, 120 Ω	(-80 to 100) °C (100 to 260) °C	0.070 °C 0.13 °C	
Cu 427, 10 Ω	(-100 to 260) °C	0.27 °C	

Parameter/Equipment	Range	CMC ² (±)	Comments
Electrical Calibration of Thermocouple Indicators & Indicating Systems ³ –			
Type E	(-250 to -100) °C (-100 to -25) °C (-25 to 350) °C (350 to 650) °C (650 to 1000) °C	0.42 °C 0.14 °C 0.13 °C 0.16 °C 0.18 °C	Fluke 5520A
Type J	(-210 to -100) °C (-100 to -30) °C (-30 to 150) °C (150 to 760) °C (760 to 1200) °C	0.41 °C 0.18 °C 0.17 °C 0.15 °C 0.19 °C	
Type K	(-200 to -100) °C (-100 to -25) °C (-25 to 120) °C (120 to 1000) °C (1000 to 1372) °C	0.27 °C 0.16 °C 0.16 °C 0.22 °C 0.33 °C	
Type N	(-200 to -100) °C (-100 to -25) °C (-25 to 120) °C (120 to 410) °C (410 to 1300) °C	0.34 °C 0.21 °C 0.20 °C 0.19 °C 0.23 °C	
Type R	(0 to 250) °C (250 to 1000) °C (1000 to 1400) °C (140 to 1767) °C	0.51 °C 0.31 °C 0.32 °C 0.38 °C	
Type T	(-250 to -150) °C (-150 to 0) °C (0 to 120) °C (120 to 400) °C	0.51 °C 0.20 °C 0.14 °C 0.13 °C	
Thermistors	(-80 to -40) °C (-40 to 100) °C (100 to 150) °C	0.084 °C 0.0063 °C 0.0095 °C	Decade resistance boxes

Parameter/Range	Frequency	CMC ^{2, 10} (±)	Comments
AC Voltage – Generate ³			
(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	0.072 % + 5.5 μV 0.014 % + 5.5 μV 0.018 % + 5.5 μV 0.09 % + 5.5 μV 0.31 % + 11 μV 0.72 % + 45 μV	Fluke 5520A
(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	0.027 % + 7.2 μV 0.012 % + 7.2 μV 0.014 % + 7.2 μV 0.032 % + 7.2 μV 0.072 % + 29 μV 0.18 % + 63 μV	
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	0.027 % + 45 μV 0.011 % + 23 μV 0.017 % + 45 μV 0.027 % + 45 μV 0.063 % + 110 μV 0.22 % + 0.54 mV	
(750 to 1020) V	45 Hz to 1 kHz (1 to 5) kHz (5 to 10) kHz	0.022 % + 15 mV 0.018 % + 16 mV 0.022 % + 15 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	0.048 % + 4.0 μV 0.027 % + 1.5 μV 0.040 % + 1.5 μV 0.13 % + 1.5 μV 0.67 % + 1.5 μV 0.53 % + 2.7 μV	HP 3458A
(10 to 100) 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 300 kHz to 1 MHz	0.027 % + 5.8 μV 0.0094 % + 3.2 μV 0.019 % + 2.7 μV 0.040 % - 2.7 μV 0.11 % + 2.7 μV 0.40 % + 13 μV 1.3 % + 1.3 μV	

Parameter/Range	Frequency	CMC ^{2, 10} (±)	Comments
AC Voltage – Measure ³ (cont)			
100 mV to 1 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	0.027 % + 56 μV 0.0094 % + 28 μV 0.019 % + 27 μV 0.040 % + 27 μV 0.11 % + 27 μV 0.40 % + 0.23 mV 1.3 % + 0.13 mV	HP 3458A
(0.7 to 5) kV	60 Hz	0.15 % - 0.45 V	Fluke 80E-10 w/ HP3458A
AC Voltage – Generate & Measure ³			
(1 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	0.0096 % + 0.55 mV 0.0095 % + 0.27 mV 0.019 % + 0.27 mV 0.040 % + 0.27 mV 0.11 % + 0.27 mV 0.40 % + 1.3 mV 1.3 % + 1.3 mV	Fluke 5520A and/or HP 3458A
(10 to 100) 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	0.027 % + 5.4 mV 0.027 % + 2.7 mV 0.027 % + 2.7 mV 0.047 % + 2.7 mV 0.16 % + 2.7 mV 0.53 % + 13 mV	
(100 to 750) V	(1 to 40) Hz 40 Hz to 1 kHz (1 to 20) kHz (20 to 50) kHz (50 to 100) kHz	0.053 % + 56 mV 0.054 % + 26 mV 0.080 % + 27 mV 0.16 % + 27 mV 0.40 % + 27 mV	

Parameter/Range	Frequency	CMC ^{2, 10} (±)	Comments
AC Current – Generate ³			
(1.1 to 3) A	(10 to 45) Hz 45 Hz to 1 kHz (1 to 5) kHz (5 to 10) kHz	0.16 % + 86 µA 0.055 % + 0.13 mA 0.54 % + 0.90 mA 2.3 % + 4.5 mA	Fluke 5520A
(3 to 11) A	(45 to 100) Hz (100 to 1000) Hz (1 to 5) kHz	0.056 % + 1.8 mA 0.091 % + 1.8 mA 2.7 % + 1.8 mA	
(11 to 20) A	(45 to 100) Hz (100 to 1000) Hz (1 to 5) kHz	0.11 % + 4.4 mA 0.14 % + 4.4 mA 2.7 % + 4.5 mA	
Toroidal Clamps & Clamp Meters			
(20 to 150) A (150 to 1025) A	(45 to 65) Hz	0.26 % + 22 mA 0.30 % + 38 mA	Fluke 5520A w/ Fluke 5500A/coil
(20 to 150) A (150 to 1025) A	(65 to 440) Hz	0.71 % + 24 mA 0.75 % + 70 mA	
Non-Toroidal Clamps & Clamp Meters			
(20 to 150) A (150 to 1025) A	(45 to 65) Hz	0.51 % + 0.22 A 0.52 % + 0.78 A	
(20 to 150) A (150 to 1025) A	(65 to 440) Hz	0.90 % + 0.22 A 0.92 % + 0.79 A	
AC Current – Generate & Measure ³			
Up to 100 µA	(10 to 20) Hz (20 to 45) Hz (45 to 100) Hz 100 Hz to 5 kHz	0.46 % + 23 nA 0.17 % + 23 nA 0.07 % + 23 nA 0.07 % + 23 nA	Fluke 5520A and/or HP 3458A
100 µA to 1 mA	(10 to 20) Hz (20 to 45) Hz (45 to 100) Hz 100 Hz to 5 kHz (5 to 20) kHz (20 to 50) kHz	0.17 % + 23 µA 0.17 % + 0.23 µA 0.07 % + 0.23 µA 0.035 % + 0.23 µA 0.068 % + 0.25 µA 0.46 % + 0.46 µA	

Parameter/Range	Frequency	CMC ^{2, 10} (±)	Comments
AC Current – Generate & Measure ³ (cont)			
(1 to 10) mA	(10 to 20) Hz (20 to 45) Hz (45 to 100) Hz 100 Hz to 5 kHz (5 to 20) kHz (20 to 50) kHz	0.46 % + 2.3 μA 0.17 % + 2.3 μA 0.07 % + 2.3 μA 0.035 % + 2.3 μA 0.07 % + 2.3 μA 0.46 % + 4.6 μA	Fluke 5520A and/or HP 3458A
(10 to 100) mA	(10 to 20) Hz (20 to 45) Hz (45 to 100) Hz 100 Hz to 5 kHz (5 to 20) kHz (20 to 50) kHz	0.46 % + 23 μA 0.17 % + 23 μA 0.07 % + 23 μA 0.035 % + 23 μA 0.07 % + 23 μA 0.46 % + 46 μA	
100 mA to 1 A	(10 to 20) Hz (20 to 45) Hz (45 to 100) Hz 100 Hz to 5 kHz (5 to 20) kHz	0.46 % + 0.23 mA 0.46 % + 0.23 mA 0.093 % + 0.23 mA 0.12 % + 0.23 mA 0.35 % + 0.23 mA	
Measure Only (1 to 20) A	45 Hz to 1 kHz (1 to 5) kHz	0.031 % + 65 μA 0.046 % + 0.21 mA	w/ Fluke Y5020 shunt
Distortion (THD)	20 Hz to 20 kHz (20 to 100) kHz	14 % of Indicated THD 30 % of Indicated THD	HP 8903A

Parameter/Range	Frequency	CMC ^{2,7} (\pm)	Comments
Oscilloscopes ³ –			
DC & Square Wave	Into 50 Ω	0.20 % + 32 μ V	Fluke 5520A/SC1100
DC Only	Into 1 M Ω	0.04 % + 32 μ V	
Square Wave	Into 1 M Ω	0.09 % + 32 μ V	
Leveled Sine Wave	50 kHz reference	1.7 % + 0.24 mV	
	Relative to 50 kHz reference –		
	50 kHz to 100 MHz	1.3 % + 80 μ V	Fluke 5520A/SC1100
	(100 to 300) MHz	1.7 % + 80 μ V	
	(300 to 600) MHz	3.3 % + 80 μ V	
	(600 to 1100) MHz	5.8 % + 0.12 mV	
Time Marker	5 s to 50 ms 50 ms to 2 ns	0.20 % - 0.36 ms 2.3 μ s/s	

III. Electrical – Microwave/RF

Parameter/Range	Frequency	CMC ^{2,9} (\pm)	Comments
Relative Power – Measure & Measuring Equipment			
(0 to -10) dBm	10 MHz to 26.5 GHz	0.026 dB	HP 8902A w/ 11793A
(-10 to -20) dBm		0.038 dB	
(-20 to -30) dBm		0.046 dB	
(-30 to -40) dBm		0.063 dB	
(-40 to -50) dBm		0.082 dB	
(-50 to -60) dBm		0.084 dB	
(-60 to -70) dBm		0.10 dB	
(-70 to -80) dBm		0.12 dB	
(-80 to -90) dBm		0.13 dB	
(-90 to -100) dBm		0.14 dB	
(-100 to -110) dBm	(2.5 to 1300) MHz	0.15 dB	
(-110 to -120) dBm		0.17 dB	

Parameter/Range	Frequency	CMC ^{2, 7, 9} (±)	Comments
Absolute Power – Measure & Measuring Equipment			
(20 to 30) dBm	100 kHz to 2.6 GHz (2.6 to 12) GHz (12 to 26.5) GHz	0.26 dB 0.28 dB 0.32 dB	HP 8902A w/ 11793A, HP 11722A, HP 11792A
(10 to 20) dBm	100 kHz to 2.6 GHz (2.6 to 12) GHz (12 to 26.5) GHz	0.23 dB 0.25 dB 0.30 dB	
(0 to 10) dBm	100 kHz to 2.6 GHz (2.6 to 12) GHz (12 to 26.5) GHz	0.21 dB 0.23 dB 0.28 dB	
(-10 to 0) dBm	100 kHz to 2.6 GHz (2.6 to 12) GHz (12 to 26.5) GHz	0.34 dB 0.24 dB 0.30 dB	
(-20 to -10) dBm	100 kHz to 2.6 GHz (2.6 to 12) GHz (12 to 26.5) GHz	0.27 dB 0.29 dB 0.34 dB	
High RF Power – Measure			
(0.3 to 1000) W	25 MHz to 1 GHz	3.3 %	Bird 4421 w/ 4022
Amplitude Modulation –			
Carrier: 150 kHz to 10 MHz Depth: Up to 99 %	(20 to 50) Hz (0.05 to 100) kHz	3.0 % 2.0 %	HP 8902A
Carrier: (0.01 to 1.3) GHz Depth: Up to 99 %	(20 to 50) Hz (0.05 to 100) kHz	1.0 % 3.0 %	
Frequency Modulation –			
Carrier: (0.25 to 10) MHz Dev: Up to 40 kHz	(0.02 to 10) kHz	2.3 % + 12 Hz	HP 8902A
Carrier: (0.01 to 1.3) GHz Dev: Up to 400 kHz	(0.05 to 100) kHz (100 to 200) kHz	1.2 % + 0.12 kHz 5.8 % + 0.12 kHz	

Parameter/Range	Frequency	CMC ^{2,7} (\pm)	Comments
Phase Modulation – Carrier (0.15 to 10) MHz Carrier (0.01 to 1.3) GHz	(0.2 to 10) kHz (0.2 to 20) kHz	4.8 % + 0.012 rad 3.7 % + 0.12 rad	HP 8902A

IV. Mechanical

Parameter/Equipment	Range	CMC ^{2,7,9} (\pm)	Comments
Force – Measure & Measuring Equipment ^{3,5}	Up to 450 lbf	0.026 %	Dead weight
Scales & Balances ^{3,5}	1 mg to 1 g (1 to 10) g 10 g to 11 kg (11 to 200) kg	0.0050 mg (0.000 48 – 0.000 038X) % 0.000 060 % 0.012 %	Troemner weights X in g Class F weights
Volume ³ – Measure & Measuring Equipment	(0.5 to 2) μ L (2 to 20) μ L (20 to 200) μ L (200 to 1000) μ L (1000 to 25 000) μ L	0.040 μ L 0.052 μ L (0.037 + 0.0033·V) μ L (0.26 + 0.0020·V) μ L (2.1 + 0.0011·V) μ L	Balances V is the volume in μ L
Torque – Measure ³	(0.42 to 600) lb.ft	0.27 %	CDI torque system
Torque – Measuring Equipment ³	(1 to 2000 ft·lbf)	0.060 %	Weights & arms
Pressure/Vacuum— Measure & Measuring Equipment ^{3,5}	(0 to -14.2) psig (0 to 6) psig (> 6 to 15 000) psig	0.038 psig 0.0061 psig 0.11 %	Digital pressure gauges & pressure/vacuum pumps

V. Thermodynamics

Parameter/Equipment	Range	CMC ^{2,9} (±)	Comments
Temperature – Measure ³	(-196 to -30) °C	0.033 °C	Fluke 5609, Fluke 1529
Temperature – Measure & Measuring Equipment ³	-78 °C	0.033 °C	Fluke 5609, Fluke 1529 with solid CO ₂ & isopropyl alcohol
	(-30 to 125) °C	0.039 °C	w/ Fluke 7103
	(125 to 425) °C	0.053 °C	w/ Fluke 9172
	(425 to 650) °C	0.15 °C	w/ Omega CL700A
	Ice Point (Generate only)	0.0027 °C	ASTM E563 ice point
Thermocouples	(-78 to 650) °C	0.057 °C	HP3458, Ice Bath, Fluke 5609 /1529
Infrared Temperature – Measure & Measuring Equipment ³	(35 to 500) °C	(0.30 + 0.0040 rdg) °C	Fluke 4181
Relative Humidity – Measure & Measuring Equipment ^{3,5}	(10 to 90) % RH (90 to 95) % RH	1.3 % RH 2.1 % RH	Vaisala M170/HMP77B

VI. Time & Frequency

Parameter/Equipment	Frequency	CMC ^{2, 6, 9} (\pm)	Comments
Frequency – Measure ^{3, 5}	1 mHz to 18 GHz	3.5 parts in $10^{12} + 0.6R$ Hz	HP Z3801A GPS locked w/ frequency counter
Frequency – Measuring Equipment ⁵	10 MHz Reference	3.5 parts in 10^{12} Hz	HP Z3801A GPS
	1 mHz to 18 GHz	3.5 parts in $10^{12} + 0.6R$ Hz	HP Z3801A GPS locked w/ signal generator
Frequency – Measuring Equipment ^{3, 5}	10 MHz Reference	2 parts in 10^9 Hz	PTB-100 rubidium standard
	1 mHz to 18 GHz	2 parts in $10^9 + 0.6R$ Hz	PTB-100 rubidium standard locked w/ signal generator or frequency counter

¹ This laboratory offers commercial calibration service and field calibration service, where noted.

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, L is the numerical value of the nominal length of the device measured in inches; D is the numerical value of the nominal diameter of the device measured in inches. R is the resolution of the unit under test.

⁵ The contributions from the "best existing device" are not included in the CMC claim.

⁶ R is the resolution of the signal generator or counter.

⁷ Unless otherwise indicated, all % means % of reading.

⁸ This scope meets A2LA's *P112 Flexible Scope Policy*.

⁹ 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.

¹⁰ 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. CMC's are expressed as either a specific value that covers the full range or as a percent or fraction of the reading plus a fixed floor specification.



Accredited Laboratory

A2LA has accredited

WESCAN CALIBRATION

Calgary, AB, CANADA

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 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 March 2021.

A blue ink signature of the Vice President of Accreditation Services.

Vice President, Accreditation Services
For the Accreditation Council
Certificate Number 1500.03
Valid to January 31, 2023

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