

Scope Of Capabilities

Calibration Specialty, Inc. maintains a wide variety of calibration services. New capabilities are added each year. The following is a comprehensive list of our general services:

1. Electrical

<u>Parameter/Equipment</u>	<u>Range</u>	<u>Accuracy</u>	<u>Comments</u>
DC Voltage – Generate	0 to 329.9999 mV	± 3 ppm + 1 μV	Fluke 5520A
	0 to 3.299999 V	±11 ppm + 2 μV	
	0 to 32.99999 V	±12 ppm + 15 μV	
	30 to 329.9999 V	±18 ppm + 150 μV	
	100 to 1000.000 V	±18 ppm + 1500 μV	
DC Current – Generate	0 to 329.999 μA	± 150 ppm + 0.02 μA	Fluke 5520A
	0 to 3.29999 mA	± 100 ppm + 0.05 μA	
	0 to 32.9999 mA	± 100 ppm + 0.25 μA	
	0 to 329.999 mA	± 100 ppm + 2.5 μA	
	0 to 1.09999 A	± 200 ppm + 40 μA	
	1.1 to 2.99999 A	± 380 ppm + 40 μA	
	0 to 10.9999 A	± 500 ppm + 500 μA	
	11 to 20.5 A	±1000 ppm + 750 μA	
Resistance – Generate	0 to 10.9999 Ω	± 40 ppm + 0.01 Ω	Fluke 5520A
	11 to 32.9999 Ω	± 30 ppm + 0.015 Ω	
	33 to 109.9999 Ω	± 28 ppm + 0.015 Ω	
	110 to 329.9999 Ω	± 28 ppm + 0.02 Ω	
	330 Ω to 1.099999 kΩ	± 28 ppm + 0.02 kΩ	
	1.1 to 3.299999 kΩ	± 28 ppm + 0.2 kΩ	
	3.3 to 10.99999 kΩ	± 28 ppm + 0.1 kΩ	
	11 to 32.99999 kΩ	± 28 ppm + 1 kΩ	
	33 to 109.9999 kΩ	± 28 ppm + 1 kΩ	
	110 to 329.9999 kΩ	± 32 ppm + 10 kΩ	
	330kΩ to 1.099999MΩ	± 32 ppm + 10 MΩ	
	1.1 to 3.299999 MΩ	± 60 ppm + 150 MΩ	
	3.3 to 10.99999 MΩ	± 130 ppm + 250 MΩ	
	11 to 32.99999 MΩ	± 250 ppm + 2500 MΩ	
	33 to 109.9999 MΩ	± 500 ppm + 3000 MΩ	
110 to 329.9999 MΩ	± 3000 ppm + 100000 MΩ		
330 to 1100 MΩ	±15000 ppm + 500000 MΩ		

Scope Of Capabilities

1. Electrical

<u>Parameter/Equipment</u>	<u>Range</u>	<u>Accuracy</u>	<u>Comments</u>
Capacitance – Generate	0.19 to 0.3999 nF	±0.5% + 0.01 nF	Fluke 5520A
	0.4 to 1.0999 nF	±0.5% + 0.01 nF	
	1.1 to 3.2999 nF	±0.5 % + 0.01 nF	
	3.3 to 10.9999 nF	±0.25% + 0.01 nF	
	11 to 32.9999 nF	±0.25% + 0.10 nF	
	33 to 109.999 nF	±0.25% + 0.10 nF	
	110 to 329.999 nF	±0.25% + 0.30 nF	
	0.33 to 1.09999 μF	±0.25% + 1.00 nF	
	1.1 to 3.29999 μF	±0.25% + 3.00 nF	
	3.3 to 10.9999 μF	±0.25% + 10.0 nF	
	11 to 32.9999 μF	±0.40% + 30.0 nF	
	33 to 109.999 μF	±0.45% + 100.0 nF	
	110 to 329.999 μF	±0.45% + 300.0 nF	
	0.33 μF to 1.09999 mF	±0.45% + 1.000 μF	
	1.1 to 3.2999 mF	±0.45% + 3.000 μf	
	3.3 to 10.9999 mF	±0.45% + 10.00 μf	
11 to 32.9999 mF	±0.75% + 30.00 μF		
33 to 110 mF	±1.1 % + 100.0 μF		
Thermocouple – Generate and Measure			Fluke 5520A
Type B	600 to 800 °C	± 0.44 °C	
	800 to 1000 °C	± 0.34 °C	
	1000 to 1550 °C	± 0.30 °C	
	1550 to 1820 °C	± 0.33 °C	
Type C	0 to 150 °C	± 0.30 °C	Fluke 5520A
	150 to 650 °C	± 0.26 °C	
	650 to 1000 °C	± 0.31 °C	
	1000 to 1800 °C	± 0.50 °C	
	1800 to 2316 °C	± 0.84 °C	

Scope Of Capabilities

1. Electrical

<u>Parameter/Equipment</u>	<u>Range</u>	<u>Accuracy</u>	<u>Comments</u>
Type E	-250 to -100 °C	± 0.50 °C	Fluke 5520A
	-100 to -25 °C	± 0.16 °C	
	-25 to 350 °C	± 0.14 °C	
	350 to 650 °C	± 0.16 °C	
	650 to 1000 °C	± 0.21 °C	
Type J	-210 to -100 °C	± 0.27 °C	Fluke 5520A
	-100 to -30 °C	± 0.16 °C	
	-30 to 150 °C	± 0.14 °C	
	150 to 760 °C	± 0.17 °C	
	760 to 1200 °C	± 0.23 °C	
Type K	-200 to -100 °C	± 0.33 °C	Fluke 5520A
	-100 to -25 °C	± 0.18 °C	
	-25 to 120 °C	± 0.16 °C	
	120 to 1000 °C	± 0.26 °C	
	1000 to 1372 °C	± 0.40 °C	
Type L	-200 to -100 °C	± 0.37 °C	Fluke 5520A
	-100 to 800 °C	± 0.26 °C	
	800 to 900 °C	± 0.17 °C	
Type N	-200 to -100 °C	± 0.40 °C	Fluke 5520A
	-100 to -25 °C	± 0.22 °C	
	-25 to 120 °C	± 0.19 °C	
	120 to 410 °C	± 0.18 °C	
	410 to 1300 °C	± 0.27 °C	
Type R	0 to 250 °C	± 0.57 °C	Fluke 5520A
	250 to 400 °C	± 0.35 °C	
	400 to 1000 °C	± 0.33 °C	
	1000 to 1767 °C	± 0.40 °C	

Scope Of Capabilities

1. Electrical

<u>Parameter/Equipment</u>	<u>Range</u>	<u>Accuracy</u>	<u>Comments</u>
Type S	0 to 250 °C	± 0.47 °C	Fluke 5520A
	250 to 1000 °C	± 0.36 °C	
	1000 to 1400 °C	± 0.37 °C	
	1400 to 1767 °C	± 0.46 °C	
Type T	-250 to -150 °C	± 0.63 °C	Fluke 5520A
	-150 to 0 °C	± 0.24 °C	
	0 to 120 °C	± 0.16 °C	
	120 to 400 °C	± 0.14 °C	
Type U	-200 to 0 °C	± 0.56 °C	Fluke 5520A
	0 to 600 °C	± 0.27 °C	
RTD Indicators-Generate			Fluke 5520A
Pt 395, 100 Ω	-200 to -80 °C	tcal ±5 °C ±0.05 °C	
	-80 to 0 °C	tcal ±5 °C ±0.05 °C	
	0 to 100 °C	tcal ±5 °C ±0.07 °C	
	100 to 300 °C	tcal ±5 °C ±0.09 °C	
	300 to 400 °C	tcal ±5 °C ±0.10 °C	
	400 to 630 °C	tcal ±5 °C ±0.12 °C	
	630 to 800 °C	tcal ±5 °C ±0.23 °C	
Pt 3926, 100 Ω	-200 to -80 °C	tcal ±5 °C ±0.05 °C	Fluke 5520A
	-80 to 0 °C	tcal ±5 °C ±0.05 °C	
	0 to 100 °C	tcal ±5 °C ±0.07 °C	
	100 to 300 °C	tcal ±5 °C ±0.09 °C	
	300 to 400 °C	tcal ±5 °C ±0.10 °C	
	400 to 630 °C	tcal ±5 °C ±0.12 °C	

Scope Of Capabilities

1. Electrical

<u>Parameter/Equipment</u>	<u>Range</u>	<u>Accuracy</u>	<u>Comments</u>
Pt 3916, 100 Ω	-200 to -190 °C	tcal ± 5 °C ± 0.25 °C	Fluke 5520A
	-190 to -80 °C	tcal ± 5 °C ± 0.04 °C	
	-80 to 0 °C	tcal ± 5 °C ± 0.05 °C	
	0 to 100 °C	tcal ± 5 °C ± 0.06 °C	
	100 to 260 °C	tcal ± 5 °C ± 0.07 °C	
	260 to 300 °C	tcal ± 5 °C ± 0.08 °C	
	300 to 400 °C	tcal ± 5 °C ± 0.09 °C	
	400 to 600 °C	tcal ± 5 °C ± 0.10 °C	
	600 to 630 °C	tcal ± 5 °C ± 0.23 °C	
Pt 385, 200 Ω	-200 to -80 °C	tcal ± 5 °C ± 0.04 °C	Fluke 5520A
	-80 to 0 °C	tcal ± 5 °C ± 0.04 °C	
	0 to 100 °C	tcal ± 5 °C ± 0.04 °C	
	100 to 260 °C	tcal ± 5 °C ± 0.05 °C	
	260 to 300 °C	tcal ± 5 °C ± 0.12 °C	
	300 to 400 °C	tcal ± 5 °C ± 0.13 °C	
	400 to 600 °C	tcal ± 5 °C ± 0.14 °C	
	600 to 630 °C	tcal ± 5 °C ± 0.16 °C	
Pt 385, 500 Ω	-200 to -80 °C	tcal ± 5 °C ± 0.04 °C	Fluke 5520A
	-80 to 0 °C	tcal ± 5 °C ± 0.05 °C	
	0 to 100 °C	tcal ± 5 °C ± 0.05 °C	
	100 to 260 °C	tcal ± 5 °C ± 0.06 °C	
	260 to 300 °C	tcal ± 5 °C ± 0.08 °C	
	300 to 400 °C	tcal ± 5 °C ± 0.08 °C	
	400 to 600 °C	tcal ± 5 °C ± 0.09 °C	
	600 to 630 °C	tcal ± 5 °C ± 0.11 °C	

Scope Of Capabilities

1. Electrical

Parameter/ Range	Frequency	Accuracy	Comments
Pt 385, 1000 Ω	-200 to -80 $^{\circ}\text{C}$	tcal $\pm 5^{\circ}\text{C} \pm 0.03^{\circ}\text{C}$	Fluke 5520A
	-80 to 0 $^{\circ}\text{C}$	tcal $\pm 5^{\circ}\text{C} \pm 0.03^{\circ}\text{C}$	
	0 to 100 $^{\circ}\text{C}$	tcal $\pm 5^{\circ}\text{C} \pm 0.04^{\circ}\text{C}$	
	100 to 260 $^{\circ}\text{C}$	tcal $\pm 5^{\circ}\text{C} \pm 0.05^{\circ}\text{C}$	
	260 to 300 $^{\circ}\text{C}$	tcal $\pm 5^{\circ}\text{C} \pm 0.06^{\circ}\text{C}$	
	300 to 400 $^{\circ}\text{C}$	tcal $\pm 5^{\circ}\text{C} \pm 0.07^{\circ}\text{C}$	
	400 to 600 $^{\circ}\text{C}$	tcal $\pm 5^{\circ}\text{C} \pm 0.07^{\circ}\text{C}$	
	600 to 630 $^{\circ}\text{C}$	tcal $\pm 5^{\circ}\text{C} \pm 0.23^{\circ}\text{C}$	
AC Voltage- Generate			Fluke 5520A
1.0 to 32.999 mV	10 to 45 Hz	800 ppm + 6 μV	
	45 Hz to 10 kHz	150 ppm + 6 μV	
	10 to 20 kHz	200 ppm + 6 μV	
	20 to 50 kHz	1000 ppm + 6 μV	
	50 to 100 kHz	3500 ppm + 12 μV	
	100 to 500 kHz	8000 ppm + 50 μV	
33 to 329.999 mV	10 to 45 Hz	300 ppm + 8 μV	Fluke 5520A
	45 Hz to 10 kHz	145 ppm + 8 μV	
	10 to 20 kHz	160 ppm + 8 μV	
	20 to 50 kHz	350 ppm + 8 μV	
	50 to 100 kHz	800 ppm + 32 μV	
	100 to 500 kHz	2000 ppm + 70 μV	
0.33 to 3.29999 V	10 to 45 Hz	300 ppm + 50 μV	Fluke 5520A
	45 Hz to 10 kHz	150 ppm + 60 μV	
	10 to 20 kHz	190 ppm + 60 μV	
	20 to 50 kHz	300 ppm + 50 μV	
	50 to 100 kHz	700 ppm + 125 μV	
	100 to 500 kHz	2400 ppm + 600 μV	

Scope Of Capabilities

1. Electrical

<u>Parameter/ Range</u>	<u>Frequency</u>	<u>Accuracy</u>	<u>Comments</u>
3.3 to 32.9999 V	10 to 45 Hz	300 ppm + 650 μ V	Fluke 5520A
	45 Hz to 10 kHz	150 ppm + 600 μ V	
	10 to 20 kHz	240 ppm + 600 μ V	
	20 to 50 kHz	350 ppm + 600 μ V	
	50 to 100 kHz	900 ppm + 1600 μ V	
33 to 329.999 V	45 Hz to 1 kHz	190 ppm + 2000 μ V	Fluke 5520A
	1 to 10 kHz	200 ppm + 6000 μ V	
	10 to 20 kHz	250 ppm + 6000 μ V	
	20 to 50 kHz	300 ppm + 6000 μ V	
	50 to 100 kHz	2000ppm + 50000 μ V	
AC Voltage- Generate			Fluke 5520A
330 to 1020 V	45 Hz to 1 kHz	300 ppm + 10000 μ V	
	1 to 5 kHz	250 ppm + 10000 μ V	
	5 to 10 kHz	300 ppm + 10000 μ V	
10 to 329.999 mV	10 to 20 Hz	0.2 % + 370 μ V	Fluke 5520A
	20 to 45 Hz	0.1 % + 370 μ V	
	45 Hz to 1 kHz	0.1 % + 370 μ V	
	1 to 5 kHz	0.2 % + 450 μ V	
	5 to 10 kHz	0.4 % + 450 μ V	
	10 to 30 kHz	0.5 % + 900 μ V	
0.33 to 3.29999 V	10 to 20 Hz	0.2 % + 450 μ V	Fluke 5520A
	20 to 45 Hz	0.1 % + 450 μ V	
	45 Hz to 1 kHz	0.09 % + 450 μ V	
	1 to 5 kHz	0.2 % + 1400 μ V	
	5 to 10 kHz	0.4 % + 1400 μ V	
	10 to 30 kHz	5.0 % + 2800 μ V	

Scope Of Capabilities

1. Electrical

<u>Parameter/ Range</u>	<u>Frequency</u>	<u>Accuracy</u>	<u>Comments</u>
3.3 to 5 V	10 to 20 Hz	0.2 % + 450 μ V	Fluke 5520A
	20 to 45 Hz	0.1 % + 450 μ V	
	45 Hz to 1 kHz	0.09 % + 450 μ V	
	1 to 5 kHz	0.2 % + 1400 μ V	
	5 to 10 kHz	0.4 % + 1400 μ V	
AC Current – Generate			Fluke 5520A
29.00 to 329.99 μ A	10 to 20 Hz	0.2 % + 0.1 μ A	
	20 to 45 Hz	0.15 % + 0.1 μ A	
	45 Hz to 1 kHz	0.125 % + 0.1 μ A	
	1 to 5 kHz	0.3 % + 0.15 μ A	
	5 to 10 kHz	0.8 % + 0.2 μ A	
	10 to 30 kHz	1.6 % + 0.4 μ A	
AC Current- Generate			Fluke 5520A
0.33 to 3.2999 mA	10 to 20 Hz	0.2 % + 0.15 μ A	
	20 to 45 Hz	0.125 % + 0.15 μ A	
	45 Hz to 1 kHz	0.1 % + 0.15 μ A	
	1 to 5 kHz	0.2 % + 0.2 μ A	
	5 to 10 kHz	0.5 % + 0.3 μ A	
	10 to 30 kHz	1.0 % + 0.6 μ A	
3.3 to 32.999 mA	10 to 20 Hz	0.18 % + 2 μ A	Fluke 5520A
	20 to 45 Hz	0.09 % + 2 μ A	
	45 Hz to 1 kHz	0.04 % + 2 μ A	
	1 to 5 kHz	0.08 % + 2 μ A	
	5 to 10 kHz	0.2 % + 3 μ A	
	10 to 30 kHz	0.4 % + 4 μ A	

Scope Of Capabilities

1. Electrical

Parameter/ Range	Frequency	Accuracy	Comments
33 to 329.99 mA	10 to 20 Hz	0.18 % + 20 μ A	Fluke 5520A
	20 to 45 Hz	0.09 % + 20 μ A	
	45 Hz to 1 kHz	0.04 % + 20 μ A	
	1 to 5 kHz	0.10 % + 50 μ A	
	5 to 10 kHz	0.2 % + 100 μ A	
	10 to 30 kHz	0.4 % + 200 μ A	
33 to 329.99 mA	10 to 20 Hz	0.18 % + 20 μ A	Fluke 5520A
	20 to 45 Hz	0.09 % + 20 μ A	
	45 Hz to 1 kHz	0.04 % + 20 μ A	
	1 to 5 kHz	0.10 % + 50 μ A	
	5 to 10 kHz	0.2 % + 100 μ A	
	10 to 30 kHz	0.4 % + 200 μ A	
0.33 to 1.09999 A	10 to 45 Hz	0.18 % + 100 μ A	Fluke 5520A
	45 Hz to 1 kHz	0.05 % + 100 μ A	
	1 to 5 kHz	0.6 % + 1000 μ A	
	5 to 10 kHz	2.5 % + 5000 μ A	
AC Current- Generate			Fluke 5520A
1.1 to 2.99999 A	10 to 45 Hz	0.18 % + 100 μ A	
	45 Hz to 1 kHz	0.06 % + 100 μ A	
	1 to 5 kHz	0.6 % + 1000 μ A	
	5 to 10 kHz	2.5 % + 5000 μ A	
3 to 10.9999 A	45 to 100 Hz	0.06 % + 2000 μ A	Fluke 5520A
	100 Hz to 1 kHz	0.10 % + 2000 μ A	
	1 to 5 kHz	3.0 % + 2000 μ A	
11 to 20.5 A	45 to 100 Hz	0.12 % + 5000 μ A	Fluke 5520A
	100 Hz to 1 kHz	0.13 % + 5000 μ A	
	1 to 5 kHz	3.0 % + 5000 μ A	

Scope Of Capabilities

2. Force

<u>Parameter/Equipment</u>	<u>Range</u>	<u>Accuracy</u>	<u>Comments</u>
Cable Tensiometer Std.	0-500 lb	± 0.5% F.S.	Chatillon C105-1001-600-00
Load Cell	0-5000 lb	± 0.037% F.S.	OMEGA LCCA-5

3. Dimensional

<u>Parameter/Equipment</u>	<u>Range</u>	<u>Accuracy</u>	<u>Comments</u>
Gage Blocks	1 to 20 in	± 1 µin	Edmunds Tol 2200 Twin Head Ultra Precision Comparator
Pitch Diameter	4 to 80	ANSI/ASME B1.2 1983	Deltronic Thread Wires w/ P&W Supermic Model C
	0.35 to 10.0 mm	ANSI/ASME B1.16M 1984	
Length	0 to 0.05 in	± 0.00001 in	Mitutoyo 521-102
	Up to 100 in	± 80 µin	Gage Blocks
Internal	Up to 12 in	± 5 µin	Sheffield N-9 Internal Comparator
Mass	1 to 500 mg	± 0.010 mg	Rice Lake SS Weights Type II, Class 1
	1 to 500 g	± 1.2 mg	
	1 to 5 kg	± 12 mg	

Scope Of Capabilities

4. Pressure

<u>Parameter/Equipment</u>	<u>Range</u>	<u>Accuracy</u>	<u>Comments</u>
Absolute	0 to 500 psia	± 0.01% I.V.	Ruska 6660-804
Vacuum	0 to 30 in Hg	± 0.1 F.S.	Druck DPI602
Pressure	0 to 6 in H ₂ O	± 1% F.S.	Dwyer 246
	0 to 10 in H ₂ O	± 0.33% F.S.	W&T 62C-4C-0010
	0 to 12 in H ₂ O	± 0.001in H ₂ O	Dwyer 234A
	0 to 20 in H ₂ O	± 3% F.S.	Dwyer 475-1 MKII
	0 to 30 in H ₂ O	± 0.33% F.S.	W&T FA145
	0 to 60 in H ₂ O	½ scale increment	Meriam 33KB35
	4 to 253 in H ₂ O	± 0.05% I.V.	Ametek PK254-15
	0 to 15 psi		
	0 to 300 psi	± 0.1 F.S.	Druck DPI602
	0.2 to 25 psi	± 0.001% I.V.	Ruska 2465
	2.0 to 1000 psi	± 0.01% I.V.	
	6.0 to 2400 psi	± 0.01% I.V.	Ruska 2400
	30 to 12000 psi		
0 to 100 psi	± 0.1% F.S.	Heise Gage	
0 to 300 psi	± 0.1% F.S.		
0 to 1000 psi	± 0.1% F.S.		
0 to 1500 psi	± 0.1% F.S.		
0 to 3000 psi	± 0.1% F.S.		
0 to 20,000 psi	± 0.1% F.S.		

Scope Of Capabilities

5. Torque

<u>Parameter/Equipment</u>	<u>Range</u>	<u>Accuracy</u>	<u>Comments</u>
Torque Tester	0-100 ozin	± 1% I.V. + ½ ozin	Cleco H-010
Torque Transducer	0-100 lbin	± 0.1% F.S.	Norbar 50003.ETS
Torque Transducer	0-100 lbft	± 0.1% F.S.	Norbar 50008.ETS
Torque Transducer	0-500 lbft	± 0.1% F.S.	Norbar 21215.ETS
Torque Transducer	0-1000 lbft	± 0.1% F.S.	Norbar 20540.ETS

6. Temperature

<u>Parameter/Equipment</u>	<u>Range</u>	<u>Accuracy</u>	<u>Comments</u>
Dry Block Calibrator	-17 to 123 °C	± 0.5 °C	Ametek Joffra D40
Platinum RTD Probe	-13 to 260 °C	Resistance 100Ω ± 0.1Ω at 0 °C	Fluke/Burns Y2037
	0 to 200 °C	± 0.03 °C	